MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

VOL. XXV. JUNE, 1897. No. 6

INTRODUCTION.

The MONTHLY WEATHER REVIEW for June, 1897, is based on 2,927 reports from stations occupied by regular and voluntary observers, classified as follows: 143 from Weather Bureau stations; numerous special river stations; 33 from post surgeons, received through the Surgeon General, U. S. Army; 2,588 from voluntary observers; 96 received through the Southern Pacific Railway Company; 14 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 32 from Canadian stations; 1 from Hawaii; 20 from Mexican stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico, Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica, and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the meteorological tables contained in the last section are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time, and, as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to generally conform to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are generally corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

The paths of the centers of low pressure did not generally pass over the States east of the Mississippi, and most of them passed north of the Lake Region; the mean pressure was generally deficient. The mean temperature was deficient in the northern sections east of the Rocky Mountains, but in excess in the southern sections, and vice versa on the Pacific coast. The mean temperature was the lowest on record for the month in the Lake Region, the Middle States, and New England. Precipitation was in excess from Kansas to New England, but was deficient in the central Gulf coast. Numerous severe local storms occurred among which the most important were those of the 10th in Minnesota and the 24th in Kansas.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressure* during the current month was highest in southern Florida and nearly as high on the coast of northern California. It was lowest in Arizona and nearly as low in Montana and the Northwest Canadian Provinces and Newfoundland.

The highest reduced pressures were: In the United States, Key West, 30.07; Jupiter and Tampa, 30.06; Eureka, 30.05; Charleston, 30.04; Jacksonville, 30.03. In Canada, Bermuda, 30.11; Port Stanley, 29.97; White River, 29.95; Parry Sound, Ottawa, and Halifax, 29.93; Yarmouth, 29.92; Sydney, 29.91. The lowest were: In the United States, Phœnix, 29.72; El Paso, 29.79; Havre, 29.80; Dodge City, 29.82; Williston, 29.83. In Canada, St. Johns, N. F., 29.79; Prince Albert and Grindstone, 29.80; Calgary, 29.83; Kamloops, 29.84.

As compared with the normal for June, the mean pressure was generally slightly deficient, the principal excesses being a few hundredths on the east Gulf coast and in the Northwest Provinces. The regions of greatest deficiency were New Brunswick, Newfoundland, the coast of New England, the Missouri Valley, and the interior of the Pacific coast States.

The greatest excesses were: In the United States, Helena, Port Huron, and Denver, 0.04; Key West and Galveston, 0.03. In Canada, Minnedosa and Swift Current, 0.04; Edmonton, Qu'Appelle, and Saugeen, 0.03. The deficits were: In the United States, Concordia, 0.07; Havre, Miles City, and Omaha, 0.06; Portland, Me., Nantucket, and New Haven,

0.05. In Canada, St. Johns, N. F., 0.18; Chatham, 0.06; Quebec and Kingston, 0.03.

As compared with the preceding month of May, the pressures reduced to sea level show falls throughout the country. The regions of greatest falls were Kansas and Nebraska and Cape Breton and Newfoundland. The greatest falls were: In the United States, Concordia, 0.18; Dodge City and Wichita, 0.17; Omaha, 0.16; Yankton, 0.15. In Canada, St. Johns, 0.22; Sydney, 0.13; Calgary and Halifax, 0.12; Chatham, 0.11; Minnedosa, 0.10.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month of June seven high areas and nine low areas were sufficiently well defined to be charted. (See Charts I and II.) The accompanying table gives the principal facts as to the region of origin and disappearance of these areas, the length of path, and apparent velocity, and a few general remarks are added.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	45	90	3, a. m.	33	75	1,200	2.0	600	25.0
II	2, p. m.	47	125	8, p. m.	44	66	4,490	6.0	748	31.2
III	4, p. m.	48	124	7, a. m.	32	99	1,880	2.5	751	31.3
IV	5, p. m.	52	105	11, p. m.	34	77	3,200	6.0	533	22.2
V	6, p. m.	41	126	11, p. m.	41	100	2,200	5.0	439	18.3
VI	15, a. m.	39	123	23, a. m.	37	71	3,670	8.0	459	19.1
VII	23, a. m.	54	115	30, a. m.	28	81	3,150	7.0	450	18.8
Total							19,790	36.5	3,980	
Mean of 7 paths							2,827	5.2	568	23.7
Mean of 30.5 days									542	22.6
Low areas.										
I	1, a. m.	38	106	4, p. m.	47	81	1,500	3.5	429	17.9
II	4, p. m.	48	102	6, p. m.	43	82	1,310	2.0	657	27.4
III	6, a. m.	34	94	8, a. m.	31	80	1,160	2.0	582	24.2
IV	6, p. m.	50	117	10, p. m.	39	100	2,020	4.0	505	21.0
V	10, p. m.	53	118	19, a. m.	41	95	4,300	8.5	506	21.0
VI	19, p. m.	46	78	21, p. m.	48	65	630	2.0	315	13.1
VII	20, a. m.	41	125	22, a. m.	50	89	2,090	2.0	1,047	43.7
VIII	22, a. m.	52	111	26, a. m.	47	59	2,900	4.0	726	30.3
IX	28, a. m.	51	122	*	50	94	1,500	3.0	500	20.8
Total							17,410	31.0	5,266	
Mean of 9 paths							1,934	3.4	585	24.4
Mean of 31 days									562	23.4

* July 1, a. m.

HIGHS.

No. I was the continuation of VII of the May REVIEW. Its velocity of 16 miles per hour in May was accelerated to 25 miles in June, as it advanced southeast to the south Atlantic Coast, where it was last noted a. m. of the 3d. As noted in the May REVIEW, there was this month also a general motion of highs II, III, V, and VI first along the Pacific Coast northward, and then east or southeast toward the Atlantic Coast, where II and VI disappeared p. m. of the 8th and a. m. of the 23d, respectively; V was last noted in Nebraska p. m. of the 11th, and III in Texas a. m. of the 7th. It is probable that this northward shift of these highs was due to the apparent motion of the Pacific permanent high.

The general track of the highs was along rather high latitudes. Nos. I, IV, VI, and VII united with the permanent Atlantic high pressure area.

The heaviest rains of the month were on the 4th in the Gulf States between high II and the permanent Atlantic high. Apparently the presence of a well-defined low was not needed for these rains.

LOWS.

Most of the storms of the month began to the north of Montana, and their general track was eastward to the north of our stations of observation. Only one, No. VII, began off the Pacific Coast.

Two of these storms, VI and VIII, reached the Gulf of St. Lawrence; all the rest were dissipated or filled up in the interior of the country.

The heaviest rainfall in northern latitudes occurred on the 17th in the Lake Region. In this case low area No. V was central in Assiniboia, the pressure at Medicine Hat, 29.18, was the lowest of the month. Since the distance from this low to the region of rainfall was over 1,200 miles it is highly probable that the rain was due to secondary conditions which, however, do not appear by bendings of isobars or wind directions.

The thunderstorms of the month reached a culmination on the 14th and 15th in the evening and on the 23d in the morning.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

2d.—David, Indian Ter. (1 mile southwest of Chelsea), 6 p. m. central time; 1 killed, 8 injured; property loss, $3,000; path from 200 yards to ½ mile wide, length uncertain, said to be 30 miles; moved to the east. Heavy rains and winds throughout portions of eastern Texas on the 2d and 3d injured growing crops and wrecked possibly as many as 30 buildings, the greatest destruction at a single place occurring at Grand Prairie, within 13 miles of Dallas. Newspaper reports place the damage to crops at a quarter of a million dollars.

3d.—On this date severe local storms were reported from Texas, Mississippi, Alabama, and New York. The storm in New York State seems to have been a true tornado. It was first observed near Westmoreland, Oneida County, at 5 p. m. eastern time. One person was killed and 3 injured. The funnel cloud is described as having an irregular swaying motion, rising and falling alternately. It moved toward the east in a path about ½ a mile wide and 5 miles long. A conservative estimate places the amount of damage at $18,000.

7th.—Destructive hailstorms were reported in Pratt, Reno, Sedgwick, and Sumner counties, Kans.

10th.—A widespread and rather destructive storm of wind and rain overspread eastern Colorado and the western border of Kansas on the evening of the 10th. A number of washouts on the railroads interfered with travel, and the damage to culverts and bridges was considerable.

Several minor tornadoes were observed in southern Minnesota on the evening of the 10th. In most cases the funnel cloud at the point of contact with the earth was quite small; the whirl covered a small area and the destruction of life and property was not great. The most severe whirl originated in Lyle Township, Mower County, near the State line, and moved eastward rather slowly, being clearly visible when a mile away. But 1 person was killed although 22 were more or less injured. The property loss was probably $10,000. Path of the storm 80 rods wide, 6 miles long; moved east.

The second storm of importance was first observed north of Mapleton, Blue Earth County, about 4 p. m., central time. It moved a little north of east into Waseca County, passing near Little Cobb and Alma City, where it was last observed. Two persons were injured and the property loss probably reached $6,000. The path of the storm was quite narrow, probably 100 feet on the average, and the distance traveled was about 12 miles. The third storm formed about 2 p. m. in Kandiyohi County, near the railroad station of the same name. No casualties; path, 20 feet wide; 3 miles long; property loss about $1,000; moved northeast.

The tornado cloud was closely observed by Mr. Charles U. Peterson, who remarks upon it as follows:

This storm passed about 3 miles south of town but I was within 80 rods from it, and saw how it worked. The main cloud was quite a ways up, while the funnel came down to the ground. It appeared to be about the same size from top to bottom, about 12 feet in diameter and perfectly white. The roar sounded as when a heavy train comes thundering along, *although not a breath of wind was to be felt where I was.*

Other funnel clouds were doubtless observed of which no record has been made.

13th. A few isolated but destructive wind and hail storms were reported as occurring in central and eastern Ohio. Newspaper estimates of the damage at Columbus, Ohio, place the amount at $10,000.

14th.—Damaging hailstorms occurred in central Connecticut.

16th.—Severe local storms visited central Ohio.

17th and 18th.—Severe local storms occurred on the 17th in Oklahoma, Kansas, Nebraska, and Missouri, passing eastward into adjoining States on the early morning of the 18th without any noticeable decrease in intensity. The blow at Louisville, Ky., was reported by the local press as being the most severe since the memorable tornado of March 27, 1890. Four boys were killed and 5 injured on the farm of the State Asylum for the feebleminded near Lincoln, Ill. The barn in which the boys had taken shelter was blown down by the gale.

19th.—Severe local storms were experienced in the mountain regions of Pennsylvania,

20th.—A severe local storm in the vicinity of Duncan, Platte County, Neb., caused the destruction of 3 buildings and other smaller structures.

24th.—The hailstorms that occurred in Topeka and Pueblo, Kans., on this date were of extraordinary violence. The size of the stones was carefully determined at both places. Observer Jennings, of Topeka, Kans., describes them in the following words:

While the big hail was falling the observer placed a bucket over his head, and with another bucket ran out and scooped up a dozen balls. With a knife frequently steeped in hot water, these were cut in two and measured, giving the following diameters: One 4.75 inches, one 6.0, one 5.25, one 4.0, one 3.0 one 3.5, one 5.0, one 4.0, one 3.0, one 3.5, one 3.5, one 3.0, one 3.0, giving a mean for the whole lot of 4 inches.

In Topeka 26 people were more or less severely injured by the hail. Much damage was done to roofs, skylights were broken to pieces, and the upper floors damaged by rain. The storm was local, not extending, so far as known, beyond the limits of Shawnee County.

The hailstones that fell in Pueblo were not quite so large as those that fell in Topeka, the largest measuring from 2 to 2.75 inches in diameter and weighing from 4 to 8 ounces. The damage to windows and roofs was not great, since the large hail was confined to a portion of the southern part of the city only. Hail began at Topeka at 7:35 p. m.; at Pueblo, 8:15 p. m., eastern time.

On the same date a tornado was observed north of Culver, Ottawa County, Kans. It moved a little north of east for a distance of 5 or 6 miles, passing and partly demolishing about twenty farm houses. The house of George W. Geesey was totally destroyed, 3 of the inmates killed and 4 severely injured. Property loss about $3,000.

26th.—Heavy rains and high winds in eastern Kansas and Missouri, also in South Carolina.

27th.—High winds in central Arkansas, accompanied by heavy rain.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperatures and the departures from the normal, as determined from records of the maximum and minimum thermometers, are given in Table I for the regular stations of the Weather Bureau, which also gives the height of the thermometers above the ground at each station. The mean temperature is given for each station in Table II, for voluntary observers.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II. The mean temperatures given in Table III for Canadian stations are the simple means of 8 a. m. and 8 p. m. simultaneous observations.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: In the United States, Jacksonville, 83.4; Yuma, 83.0; Phœnix, Port Eads, and Montgomery, 82.6; Key West, 82.2. In Canada, Swift Current and Ottawa, 60.7; Kamloops, 64.4; Winnipeg and Toronto, 60.8; Port Stanley, 60.6; Montreal, 60.3. The *lowest* were: In the United States, Tatoosh Island, 53.7; Sault Ste. Marie, 53.8; Eastport, 54.0; Port Angeles, 54.1; Duluth, 54.2; Marquette, 54.6. In Canada, St. Johns, N. F., 47.2; Grindstone, 49.9; Farther Point, 51.2; Yarmouth, 53.0; Sydney, 53.2; Port Arthur, 54.8; White River, 55.0.

As compared with the normal for June, the mean temperature for the current month was in excess in the South Atlantic and Gulf States and on the north Pacific Coast. It was deficient in the Lake Region, New England, and Maritime Provinces.

The greatest excesses were: In the United States, Jacksonville and Wichita, 3.4; Montgomery, 3.1; Savannah, 3.0; Atlanta, 2.9; Port Eads, 2.7; Augusta, 2.6; Topeka, 2.5; Astoria and Keokuk, 2.1. In Canada (by the means of 8 a. m. and 8 p. m. observations), Swift Current, 2.7; Edmonton, 1.6. The deficits were: In the United States, Sault Ste. Marie, 6.0; Minneapolis and Portland, Me., 4.1; Northfield, 3.7; Duluth and Boston, 3.6; Harrisburg, 3.3. In Canada (for 8 a. m. and 8 p. m., eastern time), St. Johns, N. F., and Montreal, 4.2; Quebec, 3.9; White River, 3.7; Chatham, 2.9.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: South Atlantic, 1.6; east Gulf, 2.1. The greatest negative departures were: New England, 2.5; lower Lake, 2.4; upper Lake, 2.1.

The years of highest and lowest mean temperatures for June are shown in Table I of the REVIEW for June, 1894. The mean temperature for the current month was the highest on record at: Jacksonville, 83.4; Montgomery, 82.6; Jupiter, 81.0. It was the lowest on record at: Sault Ste. Marie, 53.8; Marquette, 54.6; Northfield, 57.4; Portland, Me., 58.2; Woods Hole, 60.2; Narragansett Pier, 61.8; Vineyard Haven, 63.0; Albany, 64.6; Harrisburg, 67.2.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 107, Phœnix (21st); 106, Yuma (frequently); 105, Fresno (30th); 104, Red Bluff (6th). The lowest maxima were: 66, Tatoosh Island (19th); 69, Eureka (11th); 70, Port Angeles (20th) and Eastport (26th); 73, Woods Hole (16th). The highest minima were: 72, Port Eads (5th); 71, Jupiter (frequently);

70, Key West (8th); 69, New Orleans (frequently) and Pensacola (6th); 68, Tampa (10th), Jacksonville (20th), Charleston (9th). The lowest minima were: 31, Idaho Falls (2d) and Marquette (5th); 32, Sault Ste. Marie (7th), Moorhead (frequently), Huron and Williston (6th).

The *years of highest maximum and lowest minimum temperatures* for June are given in the last four columns of Table I of the REVIEW for June, 1896. During the current month the maximum temperatures were equal to or above the highest on record at: Amarillo, Wichita, and Concordia, 102; Topeka and Savannah, 100; Duluth, 99; Omaha, Keokuk, and Davenport, 98; Kansas City, 97; St. Paul, 94. The minimum temperatures were equal to or below the lowest on record at: Marquette and Idaho Falls, 31; Sault Ste. Marie, 32; Duluth and La Crosse, 33; Green Bay, 34; Grand Haven, 37; Dubuque, 40; Columbia, Mo., 42; Washington, D. C., 43; Wichita, 44; Oklahoma and Springfield, Mo., 46; Kansas City, 48; Memphis, 57.

The *greatest daily range of temperature and the data for computing the extreme and mean monthly ranges* are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Williston and Idaho Falls, 45; Pueblo, 44; Carson City and Baker City, 41; Miles City, Denver, and Phœnix, 40. The smallest values were: Key West, 13; Hatteras, 14; San Diego, 15; Block Island, Woods Hole, and Corpus Christi, 16; Nantucket and Port Eads, 17; Galveston, Fort Canby, and Tatoosh Island, 18; Eureka, 19.

Among the *extreme monthly ranges* the largest were: Williston, 69; Moorhead, 64; Bismarck, 62; Carson City and North Platte, 61; Salt Lake City, Huron, and Minneapolis, 60. The smallest values were: San Diego, 16; Key West and Tatoosh Island, 20; Port Eads, Jupiter, and Hatteras, 22.

Accumulated monthly departures from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
New England	+ 3.1	+ 0.5	Ohio Valley and Tenn.	— 1.7	— 0.3
Middle Atlantic	+ 0.7	+ 0.1	North Dakota	— 5.6	— 0.9
South Atlantic	+ 1.1	+ 0.2	Northern Slope	— 0.2	0.0
Florida Peninsula	+ 1.4	+ 0.2	Southern Slope	— 0.6	— 0.1
East Gulf	+ 1.1	+ 0.2	Southern Plateau	— 4.5	— 0.8
West Gulf	+ 5.1	+ 0.8	Middle Plateau	— 5.6	— 0.9
Lower Lake	+ 1.4	+ 0.2	Middle Pacific	— 2.2	— 0.4
Upper Lake	+ 6.2	+ 1.0	South Pacific	— 3.5	— 0.6
Upper Mississippi Valley	+ 1.2	+ 0.2			
Missouri Valley	+ 0.6	+ 0.1			
Middle Slope	+ 2.7	+ 0.4			
Northern Plateau	+ 9.0	+ 1.5			
North Pacific	+ 0.4	+ 0.1			

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer. The mean wet-bulb temperature is now published in Table I; it is always intermediate, and generally about half way between the temperature of the air and of the dew-point. The quantity of water evaporated in a unit of time from the muslin surface may be considered as depending essentially upon the wet-bulb temperature, the dew-point, and the wind.

The *relative humidity*, or the ratio between the moisture that is present in the air and the moisture that it would contain if saturated at its observed temperature is given in Table I as deduced from the 8 a. m. and 8 p. m. observations. The general average for a whole day or any other interval would properly be obtained from the data given by an evaporometer, but may also be obtained, approximately, from frequent observations of the relative humidity.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month was largest, exceeding 8 inches in a small portion of western Missouri; it exceeded 6 inches in central New England, central Florida, Georgia, and South Carolina, western Arkansas, and a large portion of Missouri. Little or no rain fell over the southern Plateau Region and southern California.

The larger values for regular stations were: Tampa, 8.46; Kansas City, 7.09; Cairo, 6.87; Concordia, 6.82; Hatteras, 5.76. In Canada, Bermuda, 9.57.

Details as to *excessive precipitation* are given in Tables XI and XII.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from the self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess in parts of Kansas, Missouri, Illinois, Wisconsin, and New England. It was especially deficient on the central Gulf coast, Iowa, and southern Kansas.

The large excesses were: Minneapolis, 5.2; Green Bay, 4.3; St. Paul, 3.8; Havre, 3.4; Cairo and Concordia, 2.4. The large deficits were: Galveston, 4.5; Port Eads, 4.2.

The *average departure* for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained. (precipitation is in excess when the percentage of the normal exceeds 100):

Above the normal: New England, 107; North Dakota, 118; upper Mississippi, 111; southern Plateau, 179; northern Plateau, 135; north Pacific, 104; middle Pacific, 139.

Below the normal: Middle Atlantic, 78; south Atlantic, 84; Florida Peninsula, 84; east Gulf, 58; west Gulf, 69; Ohio Valley and Tennessee, 74; lower Lake, 75; upper Lake, 92; Missouri Valley, 95; northern Slope, 96; middle and southern Slopes, 94; middle Plateau, 55; south Pacific, 0.00.

In Canada, Professor R. F. Stupart says: "The rainfall has been above the average in British Columbia and over the greater portion of the Northwest Territories, on the higher lands of Ontario, in Prince Edward Island, over the greater part of Nova Scotia and in southern New Brunswick. Excessive rains fell during thunderstorms in Alberta and Assiniboia.

The *years of greatest and least precipitation* for June are given in the REVIEW for June, 1890. The precipitation for the current month was the greatest on record at: Green Bay, 7.56; Havre, 6.39; Pueblo, 2.13. It was the least on record at: Port Eads, 0.00; Chattanooga, 1.03; Miles City, 1.23; Omaha, 1.43; Nashville, 1.82.

The *total accumulated monthly departures* from January 1 to the end of the current month are given in the second column of the following table: The third column gives the percentage of the current accumulated precipitation relative to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	*Per ct.*		*Inches.*	*Per ct.*
Florida Peninsula	+ 4.60	122	New England	— 0.80	96
Ohio Valley and Tenn.	+ 1.20	105	Middle Atlantic	— 2.40	89
Upper Mississippi Valley.	+ 2.30	113	South Atlantic	— 2.30	91
Missouri Valley	+ 0.50	103	East Gulf	— 3.90	87
Middle Slope	+ 1.00	108	West Gulf	— 3.90	83
Southern Slope	+ 2.10	119	Lower Lake	— 2.10	88
Southern Plateau	+ 2.60	194	Upper Lake	— 0.60	97
Middle Plateau	+ 0.10	101	Northern Slope	— 0.90	90
Northern Plateau	+ 0.30	103	North Pacific	— 1.80	94
South Pacific	+ 0.80	110	Middle Pacific	— 2.30	88
North Dakota	+ 0.00	100			

SNOWFALL.

The *total monthly snowfall* at each station is given in Tables I and II. The chart of geographical distribution is omitted for this month.

The reported snowfalls may be classified as follows: California, 2 stations; Colorado, 17 stations, with amounts ranging from Trace to 10 inches; Idaho, 2; Michigan, 2; Minnesota, 1; Montana, 4; Nevada, 9; New Jersey, 1; Utah, 1.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 3, 8, 23, 26. Arizona, 29, 30. Arkansas, 1, 3, 27. California, 14, 15, 16. Colorado, 1 to 12, 21, 25 to 29. Connecticut, 14, 15, 16. Georgia, 4, 13, 15, 16, 19, 20, 21, 24. Idaho, 1, 6, 7, 8, 13, 16, 17, 19, 21, 24 to 27. Illinois, 1, 11 to 14, 16, 18, 19, 20, 23, 24. Indiana, 3, 11, 13, 17 to 20, 24. Indian Territory, 14. Iowa, 5, 10, 14, 18, 19, 22, 23, 24, 29. Kansas, 2, 5, 7, 8, 10, 14, 17, 19 to 26, 29, 30. Kentucky, 12, 13, 17 to 20, 24. Louisiana, 3, 6, 12, 22. Maine, 25, 29. Maryland, 13, 15, 25. Massachusetts, 13, 15. Michigan, 5, 6, 7, 15, 30. Minnesota, 1, 10, 16 to 19, 22, 27. Mississippi, 14, 19, 20, 22, 26. Missouri, 2, 3, 4, 7, 10, 13, 15, 18, 19, 21 to 26. Montana, 4, 7, 14, 15, 17, 21, 22, 26, 27. Nebraska, 11, 17 to 21, 24, 25, 26. Nevada, 2, 9, 15, 16, 18, 23, 25, 26, 27. New Jersey, 12, 20, 25, 30. New Mexico, 1, 11, 12, 26. New York, 1, 15. North Carolina, 4, 7, 12, 15, 16, 17, 19, 24, 28, 29. North Dakota, 8, 18. Ohio, 10, 13, 16, 19. Oklahoma, 1, 4, 13, 14, 17, 18. Oregon, 17, 19, 20, 21, 30. Pennsylvania, 1, 13, 25. South Carolina, 4, 5, 7, 8, 15, 17, 18, 23, 24, 27. South Dakota, 2, 5, 6, 14, 15, 16, 19, 21, 23, 28. Tennessee, 3, 16, 17, 24. Texas, 1, 3, 4, 6, 14. Utah, 9, 13, 15, 17. Vermont, 13. Virginia, 4, 9, 12, 13, 16, 17, 20. Washington, 26. West Virginia, 12, 13, 16, 18, 20, 29. Wisconsin, 15, 16, 17, 19, 22, 23. Wyoming, 2, 7, 29.

SLEET.

The only States reporting sleet were: Minnesota, 1st, 5th. Montana, 2d, 17th.

WIND.

The *prevailing winds* for June, 1897, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table VIII. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

Maximum wind velocities are given in Table I, which also gives the altitudes of the Weather Bureau anemometers above the ground. Maxima of 50 miles or more per hour were reported during this month at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Amarillo, Tex	18	66	w.	Helena, Mont	16	50	sw.
Chicago, Ill	2	55	s.	Lincoln, Nebr	17	55	sw.
Columbia, Mo	24	59	nw.	Montgomery, Ala	19	54	nw.
Denver, Colo	20	60	se.	New York, N. Y	1	53	nw.
Dodge City, Kans.	17	67	s.	San Antonio, Tex	3	50	n.
Fort Canby, Wash.	10	54	s.	Sioux City, Iowa	18	72	s.
Galveston, Tex	3	50	n.				

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 3d, 268; 15th, 334; 16th, 258; 19th, 325; 24th, 283; 25th, 252.

Reports were most numerous in: Florida, 239; Illinois, 329; Missouri, 527; North Carolina, 244; Ohio, 316.

Thunderstorm days were most numerous in: Florida, 30 days; Kansas, Missouri, and South Carolina, 29; Georgia, Louisiana, and North Carolina, 27; Illinois and Colorado, 26.

In Canada.—Thunderstorms were reported as follows: Halifax, 18th; Grand Manan, 16th, 18th, 28th; Yarmouth, 30th; Charlottetown, 18th, 26th; Father Point, 25th; Quebec, 12th, 15th, 21st, 24th, 25th; Montreal, 13th, 24th; Rockliffe, 6th, 7th, 12th; Toronto, 23d, 24th; White River, 12th; Port Stanley, 3d, 15th, 16th, 20th, 30th; Saugeen, 6th; Parry Sound, 23d; Port Arthur, 29th; Winnipeg, 10th, 14th, 28th, 30th; Qu'Appelle, 14th, 15th, 18th; Banff, 7th, 8th, 15th, 22d, 27th, 28th, 29th; Swift Current, 8th, 13th, 15th, 20th, 30th; Calgary, 7th, 15th, 20th, 21st; Prince Albert, 15th; Edmonton, 16th, 30th; Battleford, 30th.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 10th to the 18th, inclusive. On the remaining twenty-one days of this month 37 reports were received, or an average of about 1 per day. The dates on which the number of reports of auroras for the whole country especially exceeded this average were: 16th and 27th.

Reports were most numerous in: Illinois, New Hampshire, and Ohio, 6; North Dakota, 5; Minnesota, 4.

The number of reports was a large percentage of the number of observers in: Delaware, 50; New Hampshire, 26; North Dakota, 13.

In Canada.—Auroras were reported as follows: Yarmouth, 16th; Father Point, 2d; Quebec, 2d, 16th, 18th, 20th, 26th,

28th; Montreal, 15th; Toronto, 22d; White River, 16th; Winnipeg, 1st, 19th; Minnedosa, 3d.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 23 regular stations of the Weather Bureau by its photographic, and at 38 by its thermal effects; at one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table X for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table X for the 60 stations at which instrumental self-registers are maintained.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the durations relative to possible sunshine are derived; the observers' personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for May, 1897, is 12 per cent for photographic and 12 per cent for thermometric records.

The details are shown in the accompanying table, in which the stations are arranged according to the *total possible* duration of sunshine, and not according to the *observed* duration.

Difference between instrumental and personal observations of sunshine.

Stations.	Latitude.		Apparatus.	For whole month.		Instrumental record of sunshine.			
				Total possible.	Personal.	Photographic.	Difference.	Thermometric.	Difference.
	°	′		Hrs.	h	h	h	h	h
Key West	24	34	T.	410.2	47	.....	.....	67	+20
Tampa, Fla	27	57	T.	416.2	64	.....	.....	71	+ 7
Galveston, Tex	29	18	P.	419.0	79	90	+11	.....	.....
New Orleans, La	29	58	T.	430.9	45	.....	.....	44	− 1
Savannah, Ga	32	05	P.	425.8	48	73	+25	.....	.....
Vicksburg, Miss	32	22	T.	425.8	65	.....	.....	87	+22
San Diego, Cal	32	43	P.	428.7	61	58	− 3	.....	.....
Charleston, S. C.	32	47	T.	428.7	50	.....	.....	67	+17
Phœnix, Ariz	32	28	P.	428.7	88	98	+10	.....	.....
Atlanta, Ga	33	45	T.	431.5	53	.....	.....	56	+ 3
Los Angeles, Cal	34	06	P.	431.5	61	76	+15	.....	.....
Wilmington, N. C.	34	14	P.	431.5	62	74	+12	.....	.....
Little Rock, Ark	34	45	T.	434.3	54	.....	.....	86	+32
Chattanooga, Tenn	35	04	T.	434.3	56	.....	.....	62	+ 6
Santa Fe, N. Mex	35	41	P.	437.2	64	75	+11	.....	.....
Raleigh, N. C.	35	45	T.	437.2	46	.....	.....	73	+17
Nashville, Tenn	36	10	T.	437.2	65	.....	.....	71	+ 6
Fresno, Cal	36	43	T.	440.2	83	.....	.....	84	+ 1
Dodge City, Kans	37	45	P.	442.1	61	73	+12	.....	.....
San Francisco, Cal	37	48	T.	443.1	63	.....	.....	82	+19
Louisville, Ky	38	15	T.	443.1	46	.....	.....	71	+25
St. Louis, Mo	38	38	T.	445.9	42	.....	.....	69	+27
Washington, D. C	38	54	P.	445.9	46	58	+12	.....	.....
Kansas City, Mo	39	05	P.	445.9	37	46	+ 9	.....	.....
Cincinnati, Ohio	39	06	P.	445.9	58	.....	.....	78	+20
Baltimore, Md	39	18	T.	445.9	45	.....	.....	49	+ 4
Atlantic City, N. J	39	22	T.	445.9	46	56	+10	.....	.....
Denver, Colo	39	45	P.	449.0	44	70	+26	.....	.....
Indianapolis, Ind	39	46	T.	449.0	66	.....	.....	75	+ 9
Philadelphia, Pa	39	57	T.	449.0	39	.....	.....	54	+15
Columbus, Ohio	39	58	T.	449.0	50	.....	.....	74	+24
Harrisburg, Pa	40	16	T.	449.0	39	.....	.....	67	+28
Pittsburg, Pa	40	32	T.	451.9	50	.....	.....	54	+ 4
New York, N. Y	40	43	T.	451.9	45	.....	.....	64	+19
Salt Lake City, Utah	40	46	P.	451.9	40	71	+31	.....	.....
Eureka, Cal	40	48	P.	451.9	45	48	+ 3	.....	.....
Cheyenne, Wyo	41	08	P.	451.9	51	58	+ 7	.....	.....
Omaha, Nebr	41	16	P.	451.9	41	60	+19	.....	.....
Cleveland, Ohio	41	30	T.	456.2	43	.....	.....	52	+ 9
Des Moines, Iowa	41	35	T.	456.2	50	.....	.....	56	+ 6
Chicago, Ill	41	53	T.	456.2	47	.....	.....	52	+ 5
Erie, Pa	42	07	T.	456.2	48	.....	.....	53	+ 5
Binghamton, N. Y	42	08	T.	456.2	49	.....	.....	57	+ 8
Detroit, Mich	42	20	T.	456.2	58	.....	.....	69	+11
Boston, Mass	42	21	T.	456.2	43	.....	.....	56	+13
Dubuque, Iowa	42	30	T.	456.2	55	.....	.....	56	+ 1
Albany, N. Y	42	39	T.	459.9	45	.....	.....	66	+21
Buffalo, N. Y	42	53	T.	459.9	44	.....	.....	65	+21
Rochester, N. Y	43	08	T.	459.9	49	.....	.....	54	+ 5
Idaho Falls, Idaho	43	29	T.	459.9	63	.....	.....	69	+ 6
Portland, Me	43	39	T.	463.5	33	.....	.....	45	+12
Northfield, Vt	44	10	P.	463.5	31	49	+18	.....	.....
Eastport, Me	44	54	P.	466.7	32	47	+15	.....	.....
St. Paul, Minn	44	58	P.	466.7	33	44	+11	.....	.....
Minneapolis, Minn	44	59	T.	466.7	.....	43	.....	.....	.....
Portland, Oreg	45	32	T.	471.7	42	.....	.....	45	+ 3
	45	32	P.	471.7	42	38	− 4	.....	.....
Helena, Mont	46	34	P.	475.6	45	51	+ 6	.....	.....
Bismarck, N. Dak	46	47	P.	475.6	49	61	+12	.....	.....
Seattle, Wash	47	38	T.	479.8	32	.....	.....	46	+14
Spokane, Wash*	47	40	P.	479.8	36	.....	.....	.....	.....

*Instrument out of order.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 80.9°, or 3.1° above normal; the highest was 105°, at Hamilton on the 27th and at Pineapple on the 29th, and the lowest, 44°, at Maple Grove on the 1st. The average precipitation was 1.85, or 2.95 below normal; the greatest monthly amount, 4.42, occurred at Newburg, and the least, 0.25, at Brewton.—*F. P. Chaffee.*

Arizona.—The mean temperature was 78.3°, or 1.3° above normal; the highest was 113°, at Fort Mojave on the 4th, and the lowest, 31°, at Williams on the 16th. The average precipitation was 0.09, or 0.27 below normal; the greatest amount, 0.75, occurred at Cedar Springs, while none fell at nineteen stations.—*W. T. Blythe.*

Arkansas.—The mean temperature was 78.2°, or 1.3° above normal; the highest was 106°, at Jonesboro on the 12th and at Warren on the 22d, and the lowest, 41°, at Jonesboro on the 1st and 5th and at Silver Springs on the 4th. The average precipitation was 3.46, or 0.59 below normal; the greatest monthly amount, 6.90, occurred at Dallas, and the least, 0.60, at Arkansas City.—*F. H. Clarke.*

California.—The mean temperature was 69.8°, or 1.0° below normal; the highest was 118°, at Volcano Springs, and the lowest, 26°, at Snedden's Ranch. The average precipitation was 0.46, or 0.15 above nor-

mal; the greatest monthly amount, 5.76, occurred at Fordyce Dam; at most stations no rain fell.—*Alexander McAdie.*

Colorado.—The mean temperature was 60.8°, or 0.4° below normal; the highest was 103°, at Lamar on the 23d, and the lowest, 19°, at Alma on the 6th and at Breckenridge on the 17th. The average precipitation was 1.80, or 0.53 above normal; the greatest monthly amount, 5.53, occurred at Gold Hill, and the least, 0.24, at Garnett.—*F. H. Brandenburg.*

Florida.—The mean temperature was 82.0°, or 2.0° above normal; the highest was 102°, at De Funiak Springs on the 19th, and the lowest, 58°, at Emerson on the 4th and at Lake Butler on the 3d. The average precipitation was 4.96, or 1.10 below normal; the greatest monthly amount, 9.35, occurred at Sebastian, and the least, 2.03, at Pensacola.—*A. J. Mitchell.*

Georgia.—The mean temperature was 80.8°, or 2.9° above normal; the highest was 104°, at Leverett on the 14th and 27th, at Allentown on the 28th, at Poulan on the 18th, and at Quitman on the 29th; the lowest was 47°, at Dahlonega and Ramsey on the 1st. The average precipitation was 3.51, or 1.36 below normal; the greatest monthly amount, 8.16, occurred at Jesup, and the least, 0.91, at Adairsville.—*J. B. Marbury.*

Idaho.—The mean temperature was 59.2°; the highest was 101°, at Boise on the 12th, and the lowest, 24°, at Martin on the 1st. The average precipitation was 1.33; the greatest monthly amount, 3.96, occurred at Murray, and the least, 0.10, at Minidoka.—*D. P. McCallum.*

Illinois.—The mean temperature was 71.0°, or 0.2 below normal; the highest was 102°, at Clear Creek and Minonk on the 14th, and the lowest, 34°, at Chemung and Scales Mound on the 1st. The average precipitation was 4.57, or 0.03 below normal; the greatest monthly amount, 9.10, occurred at Chester, and the least, 0.92, at Galva.—*C. E. Linney.*

Indiana.—The mean temperature was 70.6°, or 1.5° below normal; the highest was 99°, at La Porte on the 15th, and the lowest, 36°, at La Porte on the 1st and 8th. The average precipitation was 4.31, or 0.26 above normal; the greatest monthly amount, 6.76, occurred at Kokomo, and the least, 1.65, at South Bend.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 69.1°, or 0.5° below normal; the highest was 103°, at Sigourney on the 17th, and the lowest, 29°, at Decorah and Lansing on the 1st. The average precipitation was 3.81, or 0.78 below normal; the greatest monthly amount, 9.38, occurred at Keosanqua, and the least, 1.03, at Rockwell City.—*G. M. Chappel.*

Kansas.—The mean temperature was 76.6°, or 2.7° above normal; the highest was 113°, at Lakin on the 19th, and the lowest, 38°, at Norton and Salina on the 4th. The average precipitation was 3.46, or 0.42 below normal; the greatest monthly amount, 11.01, occurred at Ottawa, and the least, 0.25, at Ulysses.—*T. B. Jennings.*

Kentucky.—The mean temperature was 73.4°, or 1.1° below normal; the highest was 101°, at Shelbyville on the 15th and at Greensburg on the 30th, and the lowest, 41°, at Middlesboro on the 1st. The average precipitation was 3.61, or 0.47 below normal; the greatest monthly amount, 7.36, occurred at Blandville, and the least, 0.80, at Bowling Green.—*Frank Burke.*

Louisiana.—The mean temperature was 80.9°, or 1.5° above normal; the highest was 105°, at Amite on the 23d, and the lowest, 52°, at Mansfield on the 5th. The average precipitation was 3.80, or 2.15 below normal; the greatest monthly amount, 9.55, occurred at Oberlin, while no rain fell at Port Eads.—*R. E. Kerkam.*

Maryland and Delaware.—The mean temperature was 68.5°, or 3.5° below normal; the highest was 97°, at Taneytown on the 30th, and the lowest, 29°, at Sunnyside on the 2d. The average precipitation was 2.80, or 0.66 below normal; the greatest monthly amount, 6.46, occurred at Sunnyside, and the least, 0.82, at Port Deposit.—*F. J. Walz.*

Michigan.—The mean temperature was 61.5°, or 5.2° below normal; the highest was 96°, at Baldwin on the 15th, and the lowest, 12°, at Humboldt on the 18th. The average precipitation was 2.41, or 0.77 below normal; the greatest monthly amount, 5.39, occurred at Olivet, and the least, 0.64, at Bay City.—*C. F. Schneider.*

Minnesota.—The mean temperature was 62.5°, or 4.0° below normal; the highest was 102°, at Mazeppa on the 14th, and the lowest, 18°, at Tower on the 1st. The average precipitation was 5.40, or 1.78 above normal; the greatest monthly amount, 9.75, occurred at Lake City.—*T. S. Outram.*

Mississippi.—The mean temperature was 81.2°, or 2.1° above normal; the highest was 111°, at Columbus on the 24th, and the lowest, 50°, at Batesville on the 5th and 6th, and at Corinth on the 1st. The average precipitation was 1.10, or 3.15 below normal; the greatest monthly amount, 4.94, occurred at Austin, and the least, 0.13, at Water Valley.—*R. J. Hyatt.*

Missouri.—The mean temperature was 73.6°, or nearly normal; the highest was 102°, at Sublett on the 17th, Princeton on the 23d, and New Madrid on the 30th; the lowest was 38°, at Liberty on the 4th and Potosi on the 6th. The average precipitation was 6.18, or 1.42 above normal; the greatest monthly amount, 11.67, occurred at Conception, and the least, 2.30, at Oto.—*A. E. Hackett.*

Montana.—The mean temperature was 60.0°, or 2.0° below normal; the highest was 105°, at Glendive on the 13th, and the lowest, 20°, at St. Paul's Mission on the 2d and 17th. The average precipitation was 3.64, or 1.00 above normal; the greatest monthly amount, 7.48, occurred at Kipp, and the least, 0.68, at St. Paul's Mission.—*R. M. Crawford.*

Nebraska.—The mean temperature was 69.5°, or 0.3° above normal; the highest was 106°, at Gothenburg on the 22d, and the lowest, 35°, at Albion on the 8th and at Lodgepole on the 16th. The average precipitation was 3.60, or 0.32 below normal; the greatest monthly amount, 12.25, occurred at Red Cloud, and the least, 0.67, at Gering.—*G. A. Loveland.*

Nevada.—The mean temperature was 62.8°, or 2.7° below normal; the highest was 112°, at St. Thomas on the 8th, and the lowest, 20°, at Hamilton on the 2d. The average precipitation was 0.37, or the normal amount; the greatest monthly amount, 1.22, occurred at Battle Mountain, while none fell at Tecoma.—*R. F. Young.*

New England.—The mean temperature was 60.7°, or 4.1° below normal; the highest was 92°, at Plymouth, N. H., on the 24th, and the lowest, 30°, at West Milan, N. H., on the 21st. The average precipitation was 4.62; the greatest monthly amount, 8.68, occurred at Cornish, Me., and the least, 1.64, at Nantucket, Mass. Rain occurred in portions of this district every day except two, and was almost continuous from the 3d to the 15th. The most remarkable falls occurred on the 9th and 10th, particularly in the interior. This storm became a matter of serious concern in some localities, as it produced overflowing rivers, undermined railroad tracks and highways, and threatened damage far in excess of that caused by spring floods. Bridges were carried away in Vermont and New Hampshire and large tracts of land were flooded in the Connecticut River Valley. Western Connecticut and Massachusetts and southern Vermont and New Hampshire received the greatest falls during this storm.—*J. W. Smith.*

New Jersey.—The mean temperature was 66.1°, or 2.6° below normal; the highest was 95°, at Vineland on the 30th, and the lowest, 35°, at Charlotteburg on the 27th. The average precipitation was 3.38, or 0.27 below normal; the greatest monthly amount, 5.50, occurred at Sergeantsville, and the least, 2.12, at Clayton.—*E. W. McGann.*

New Mexico.—The mean temperature was a little below normal; the highest was 106°, at Eddy on the 23d and Puerto de Luna on the 24th, and the lowest, 22°, at Winson's on the 18th. The precipitation was very unevenly distributed; the greatest monthly amount, 5.51, occurred at Ocate, while none fell at Olio.—*H. B. Hersey.*

New York.—The mean temperature was 61.8°, or 4.2° below normal; the highest was 93°, at Avon on the 24th and Brentwood on the 30th, and the lowest, 29°, at New Lisbon on the 2d. The average precipitation was 3.43, or 0.04 below normal; the greatest monthly amount, 6.72, occurred at Gloversville, and the least, 1.03, at Madison Barracks.—*R. M. Hardinge.*

North Carolina.—The mean temperature was 74.8°, or 0.5° above normal; the highest was 100°, at Saxon on the 16th and Chapel Hill, Rockingham, and Tarboro on the 30th; the lowest was 40°, at Linville on the 1st. The average precipitation was 3.99, or about 0.50 below normal; the greatest monthly amount, 8.84, occurred at Flat Rock, and the least, 1.42, at Willington.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 61.7°, or 2.9° below normal; the highest was 109°, at Portal on the 14th, and the lowest, 20°, at Woodbridge on the 7th. The average precipitation was 3.75, or 0.09 below normal; the greatest monthly amount, 10.40, occurred at McKinney, and the least, 0.20, at Grafton.—*B. H. Bronson.*

Ohio.—The mean temperature was 68.1°, or 2.0° below normal; the highest was 102°, at Bethany on the 15th, and the lowest, 31°, at Hillhouse on the 21st. The average precipitation was 2.85, or 0.97 below normal; the greatest monthly amount, 6.92, occurred at Pomeroy, and the least, 0.92, at St. Ignatius College, Cleveland.—*H. W. Richardson.*

Oklahoma.—The mean temperature was 77.4°; the highest was 109°, at Alva on the 22d, and the lowest, 36°, at Prudence on the 4th. The average precipitation was 3.12; the greatest monthly amount, 7.77, occurred at Purcell, and the least, 1.16 at Woodward.—*J. I. Widmeyer.*

Oregon.—The mean temperature was 60.2°, or 1.7° above normal; the highest was 94°, at Grants Pass and Pendleton on the 6th, and Riverside on the 12th; the lowest was 19°, at New Bridge on the 10th. The average precipitation was 2.15, or 0.15 above normal; the greatest monthly amount, 6.83, occurred at Bay City, and the least, 0.51, at Arlington.—*B. F. Pague.*

Pennsylvania.—The mean temperature was 64.°8, or 4.2° below normal; the highest was 96°, at Aqueduct on the 25th, and Coatesville, Gettysburg, and Lebannon on the 30th; the lowest was 28°, at Saegerstown and Shingle House on the 2d. The average precipitation was 3.38, or 0.69 below normal; the greatest monthly amount, 6.42, occurred at Neshaminy, and the least, 1.11, at Cannonsburg.—*T. F. Townsend.*

South Carolina.—The mean temperature was 79.2°, or 1.7° above normal; the highest was 103°, at Gillisonville on the 27th, and the lowest, 49°, at Holland on the 1st. The average precipitation was 5.44, or 0.82 above normal; the greatest monthly amount, 11.75, occurred at Pinopolis, and the least, 1.32, at Mount Carmel.—*J. W. Bauer.*

South Dakota.—The mean temperature was 65.0°, or 1.5° below normal; the highest was 104°, at Cherry Creek on the 12th, and the lowest, 24°, at Castlewood on the 7th. The average precipitation was 3.44, or 0.25 below normal; the greatest monthly amount, 7.76, occurred at Watertown, and the least, 0.21, at Edgemont.—*S. W. Glenn.*

Tennessee.—The mean temperature was 75.4°, or 1.2° above normal; the highest was 104°, at Milan on the 14th and at Savannah on the 23d,

and the lowest, 38°, at Erasmus on the 1st. The average precipitation was 2.94, or 1.31 below normal; the greatest monthly amount, 7.39, occurred at Greenville, and the least, 0.78, at Pope.—*H. C. Bate.*

Texas.—The mean temperature for the State was 0.5° above the normal. There was a general deficiency over the panhandle and west Texas, ranging from 0.1° to 1.2°, and along the coast the temperature ranged from the normal to 1° below, except in the vicinity of Brazoria, where there was an excess. Over other portions of the State there was a general excess, except in the vicinity of Dallas, Waco, Fredericksburg, and New Braunfels, where there was a slight deficiency. The excess ranged from 0.1° to 2.5° over north, central, and west Texas, and from 0.2° to 3.5° over southwest and east Texas, with the greatest in the vicinity of Hearne. The highest was 111°, at Childress on the 24th, and the lowest, 42°, at Sierra Blanca on the 30th. The average precipitation for the State was 0.81 below the normal. There was a general deficiency, except over the northern portion of central Texas, the western portions of north and west Texas, and in the vicinity of Cuero, Luling, San Marcos, and Boerne, where there was an excess ranging from 0.03 to 2.13, with the greatest in the vicinity of Fort Worth. The deficiency ranged from 0.01 to 3.53 over east and southwest Texas, the east portions of west and north Texas, the panhandle, and the southern portion of central Texas, and from 0.91 to 5.55 over the coast district, with the greatest deficit in the vicinity of Houston. The greatest monthly amount, 9.20, occurred at Temple, and the least, trace, at Fort Stockton.—*I. M. Cline.*

Utah.—The mean temperature was 63.2°; the highest was 104°, at Manti on the 22d, and the lowest, 20°, at Soldier Summit on the 2d. The average precipitation was 0.24; the greatest monthly amount, 0.77, occurred at Thistle, and the least, trace, at Cisco and Giles.—*J. H. Smith.*

Virginia.—The mean temperature was 71.7°, or 2.0° below normal; the highest was 103°, at Farmville on the 25th, and the lowest, 30°, at Guinea on the 2d. The average precipitation was 3.18, or 0.50 below normal; the greatest monthly amount, 11.56, occurred at Guinea, and the least, 0.71, at Spottsville.—*E. A. Evans.*

Washington.—The mean temperature was 61.4°, or 2.4° above normal; the highest was 100°, at Kennewick on the 30th, and the lowest, 28°, at Cascade Tunnel on the 14th and 17th. The average precipitation was 2.22, or 0.28 above normal; the greatest monthly amount, 5.33, occurred at North Bend, and the least, 0.30, at Sunnyside.—*E. N. Salisbury.*

West Virginia.—The mean temperature was 69.3°, or about 3.0° below normal; the highest was 96°, at Point Pleasant on the 30th, and the lowest, 35°, at Burlington on the 4th and at Nuttallburg on the 5th. The average precipitation was 4.31, or about normal; the greatest monthly amount, 6.77, occurred at Parkersburg, and the least, 1.31, at Burlington.—*H. L. Ball.*

Wisconsin.—The mean temperature was 63.2°, or 3.6° below normal; the highest was 100°, at Medford and White Hall on the 14th, at City Point on the 15th, and at Prairie du Chien on the 17th; the lowest was 22°, at Barron and Spooner on the 1st. The average precipitation was 5.41, or 1.50 above normal; the greatest monthly amount, 9.86, occurred at Amherst, and the least, 2.95, at Crandon.—*W. M. Wilson.*

Wyoming.—The mean temperature was 60.4°, or about normal; the highest was 104°, at Wamsutter on the 12th, and the lowest, 24°, at Fort Washakie on the 17th. The average precipitation was 1.47, or 0.29 below normal; the greatest monthly amount, 4.19, occurred at Sundance, and the least, 0.03, at Wamsutter.—*M. G. Renoe.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

On June 4th at Vicksburg and on the 9th at New Orleans the Mississippi fell below the danger line; the river had been in flood eighty days at Vicksburg and seventy-five at New Orleans.

All the rivers have now sunk to low summer stages, in many instances interrupting navigation. During the month local freshets of short duration occurred in the rivers of New York and North Carolina.

The highest and lowest water, mean stage, and monthly range at 114 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

The following résumé of river stages and conditions of navigation in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations and section centers:

Hudson River. (Reported by A. F. Sims, Albany, N. Y.)—The regimen of the Hudson for the month would be uneventful were it not for the fact that the copious rains of the 8th and 9th caused an abnormal June freshet. The river began to rise slowly on the afternoon of the 9th, and by 10 p. m. was within 4 feet of the string-piece of the wharves at Albany, N. Y. The water reached its highest point at 3 p. m. of the 10th, and half the sidewalks on the west side of Quay street were awash. The People's Line Steamer had to make her landing at the high wharf near Van Rensselaer Island, as the upper wharf was submerged. Reports from the tributaries say that the water was over the banks on the 9th, and that many acres of land under cultivation were submerged and considerable damage caused by the overflow.

On the morning of the 10th the water poured over the State dam at Troy to such a depth that the dam could be located only by a slight roughness in the current. The water has not been so high in June for twenty-five years.

Susquehanna River and branches. (Reported by E. R. Demain, Harrisburg, Pa.)—The rainfall averaged only about half the normal amount within the Susquehanna River basin, and consequently the stages of the water in nearly all streams of the system were below the average for June. In the lower Susquehanna a good stage was maintained notwithstanding the long period of dry weather, the water coming mostly from the north branch. At Harrisburg the average gauge reading was only 0.1 foot lower than for June, 1896, while the rainfall during the month was only half as great. On the West Branch exceptionally low stages ruled and at Cedar Run and Sinnemahoning the water was below the zero of the gauge during the entire month. The gauge readings for this part of the system averaged 0.5 of a foot as against 2.1 feet in June, 1896. The Juniata averaged about 1 foot lower than during the same period last year. The North Branch was the only river of the system reporting higher stages than last year, due, doubtless, to a heavier rainfall in the northern counties of Pennsylvania and in New York State.

Rivers of South Atlantic States. (Reported by E. A. Evans, Richmond, Va.; C. F. von Herrmann, Raleigh, N. C.; L. N. Jesunofsky, Charleston, S. C.; D. Fisher, Augusta, Ga.; and J. B. Marbury, Atlanta, Ga.)—The low water prevailing in the James River during May continued throughout June, and no changes of any importance were recorded. The weather over the James River basin was dry, and hence there was nothing to cause any increase in the low stage of water usual at this season. The extreme range of the river on the gauge was from —0.2 to 1.0 feet. On the lower river the water is becoming more than usually brackish, owing to the decrease in the volume of fresh water coming down the river.

The precipitation throughout North Carolina for June was below the normal, and although the number of rainy days was large, and some heavy local rains occurred, the rainfall seemed to have a very slight influence on the stages of the rivers. The stages were irregular, but all low, declining gradually from the highest during the first decade to the lowest during the last. The Roanoke only attained a stage of 10 feet, and that on one date. Navigation of the lower courses of the streams has been limited during the month, as is usually the case during June. Owing to the dry state of the soil, very heavy rains would now be required to cause dangerous rises in the rivers of North Carolina.

The streams of South Carolina were at a very low stage from the 16th to the 30th. There was good steamboat water on the Wateree beyond Camden. Navigation was suspended on the Pedee at Cheraw, from the 16th to the 18th, and from the 27th to the 30th, but continued uninterrupted from Winyah Bay up to Drake. The Congaree was navigable to Granby Falls. There was but little traffic on the Edisto, the Little Pedee, the Lumber and Black rivers, throughout the month, on account of low water. The Lynch and Santee remained at navigable stages.

Heavy rains in the upper portion of this State and in North Carolina on the 6th, 7th, and 8th caused moderate freshets on the upper Pedee, the upper Wateree, the Broad, and Congaree. At Camden the stream rose from a 10-foot stage on the 8th to a gauge reading of 20.0 feet, with heavy driftwood, on the 9th. The rains were unusually heavy in the upper part of Spartanburg County on the 6th and 7th. Lowland crops were covered with water to the depth of 3 to 6 feet, and cultivated lands were badly washed. Two wooden bridges were swept away at Whitney, 10 miles above Spartanburg. Several cotton mills on the

tributaries of the Broad River were compelled to shut down until the freshet passed by.

Less than the average amount of rainfall was received over the upper Savannah Valley during the month, in consequence of which no rise worthy of notice occurred in the river; in fact, for the thirty days the range was hardly 6 feet. This condition favored navigation, but at this season of the year traffic does not amount to a great deal. The crops in the river bottoms are progressing nicely and promise an enormous yield of corn if no disasters from high waters are encountered in the next three months.

Mobile River and branches. (Reported by F. P. Chaffee, Montgomery, Ala., and W. M. Dudley, Mobile, Ala.)—There has been a gradual fall in the Alabama River and its tributaries to the close of the month, when stages at all stations were less than 2 feet. There has been an entire suspension of river traffic above Selma, which, however, is always of little importance at this season.

The Mobile and Tombigbee have continued quite low during the entire month, and navigation on the upper Tombigbee has been difficult. The rains which occurred during the month were confined mostly to the coast district, being in the nature of local thunderstorms, and could, therefore, have no general effect on the rivers. There was but one general rain, on the 3d and 4th, only moderately heavy, and causing a slight rise of short duration, as considerable of the moisture was absorbed by vegetation.

Ohio River and branches. (Reported by F. Ridgway, Pittsburg, Pa.; H. L. Ball, Parkersburg, W. Va.; S. S. Bassler, Cincinnati, Ohio; F. Burke, Louisville, Ky.; P. H. Smyth, Cairo, Ill.; L. M. Pindell, Chattanooga, Tenn.; and H. C. Bate, Nashville, Tenn.)—The Ohio at Pittsburg continued to fall slowly during the first part of the month, and by the 12th had reached so low a stage that it became necessary to raise the wickets at Davis Island Dam. By the last week of the month navigation was practically suspended for all but very light craft. The packet lines were much inconvenienced by the low water, two steamers being so badly damaged by submerged timbers that it was necessary to place them in the dry docks for repairs. Both passenger and freight traffic, however, showed a decided increase during the month; 120,000 bushels of coal passed down through the lock at Davis Island during the month.

The rivers of West Virginia during June were low, almost too low for good navigation. The Ohio at Parkersburg changed but little during the month, the range being 4 feet. Until the 28th the stages were sufficient for all boats, but on that date the large packets were tied up, owing to the low water. A small rise on the 30th released them from the tie-up.

At Cincinnati the river continued slowly falling during the first eight days of the month, and a slight rise in the upper Ohio on the 9th and 10th came very opportunely, as the low water was becoming troublesome, and news of boats sticking was not infrequent. The rise, though slight, helped to keep the boats going. Although low water prevailed the greater part of the month, the stage was not as low as is generally expected at this season of the year, and navigation was maintained. The crest of a small but very helpful rise passed Cincinnati on the morning of the 24th, after which date the river steadily fell.

A good boating stage was maintained at Louisville throughout the month, the average being about 6 feet.

The lower Ohio fell from the 1st until the middle of the month, the fall continuing at Paducah until the 16th, and at Cairo until the 17th. A slight rise set in at Evansville on the 14th and continued until the 28th. This rise affected the stage at Paducah by the night of the 16th, brought the river to a stand at Cairo by the morning of the 18th, and with occasional slight rises out of the Cumberland and Tennessee, gave the river at Paducah and Cairo an upward tendency during the remainder of the month.

The Cumberland River fell steadily until the 24th, when a slight rise was in evidence. Navigation was open to lower points all the month, from Nashville to Carthage for the last three days, but above Carthage it was closed the entire month.

The Tennessee River was navigable during the entire month except at Bridgeport, where it was closed from June 1 to 11, and from the 14th to 22d. The few heavy rains over the upper Tennessee caused slight rises, which kept the river at a nearly normal stage at Chattanooga. The heavy rainfall of over two inches at Rogersville, Tenn., between 8 a. m. of the 25th and 8 a. m. of the 26th, gave a slight rise over the entire river. On July 19 a cloud burst occurred at Wallace, Va., 5 miles east of Bristol, Tenn. It caused an 8-foot tide in Beaver Creek, washing away a trestle and washing out 200 feet of track on the Norfolk and Western Railroad; trains were delayed; bottom lands were submerged at Bristol; no rain fell at the latter point. This is the first time since 1893 that the river has been navigable to all boats the entire month. The month closed with the river falling slowly, but with a splendid boating tide.

Mississippi River and minor branches. (Reported by P. F. Lyons, St. Paul, Minn.; M. J. Wright, Jr., La Crosse, Wis.; G. E. Hunt, Davenport, Iowa; F. Z. Gosewisch, Keokuk, Iowa; H. C. Frankenfield, St. Louis, Mo.; P. H. Smyth, Cairo, Ill; S. C. Emery, Memphis, Tenn.; R. J. Hyatt, Vicksburg, Miss.; R. E. Kerkam, New Orleans, La.; and C. Davis, Shreveport, La.)—The most satisfactory stage of water for navigation during any June since 1893 was maintained in the Mississippi River at St. Paul. Commencing on the 1st with a gauge reading of 5.2 feet, the minimum for the month, there were slight changes until at the end of the month the gauge indicated 6.4 feet, which was the maximum, and what boatmen consider a perfect "boating stage." It evidently has been appreciated as such, for the arrivals and departures of boats plying between St. Paul and other ports down to St. Louis, have been more regular and numerous, and the amount of business done more satisfactory than during any other June for several years back.

A good navigable stage of water was maintained at La Crosse during the month, the gauge readings ranging from 5.8 to 8.1 feet. A marked rise in the river occurred from the 8th to the 10th instants, caused by a decided rise in the Chippewa River during the early part of the month. The average stage of water for the month, 7.1 feet, was the highest for any June for the past four years, and has interfered somewhat with the river improvements which are now in progress.

At Davenport the water rose and fell in slight changes, never for many days at a time, but with a general upward tendency. The close of the month found the river higher than at the beginning. At no time did the river fall low enough to seriously interfere with navigation. The rainfall at Dubuque and southward to Muscatine was considerably below the normal; but that in the Mississippi Valley north of Dubuque was sufficient to maintain a good stage below.

The river at Keokuk has remained at a good stage for navigation, with small range, throughout the month, and with sufficient water for steamboats and lumber rafts in the channel on the Des Moines Rapids.

A very good boating stage was maintained at St. Louis throughout the month, and the frequent thunderstorms of the last week of the month caused a general rise, though not at all extensive, and the highest stage for the month at St. Louis occurred on the last day.

From St. Louis to Memphis the changes from day to day were slight; a good stage was maintained throughout the month.

At Memphis the river fell steadily from the 1st to the 20th, the gauge reading on that day being 11.8 feet, a fall of 5.4 feet. A rise set in on the 22d which continued to the close of the month, bringing the stage up to 15.7 feet, which was only 1.5 feet below that recorded on June 1. A good navigable stage was maintained throughout the month, and steamboat men report that the conditions were exceptionally favorable for boating business.

At Vicksburg the river fell below the danger line on the 4th for the first time since March 16. A steady fall continued throughout the month to a stage of 18.1 feet at its close, the total fall being over 25 feet. The water left the elevator gauge at Vicksburg on the 22d at a stage of 20 feet, and boats will land at the lower landing (Kleinston) for the present, the wharf boat having been moved to that point.

Below Vicksburg the river continued to decline during the entire month, the fall being 11 feet at New Orleans. The closing of the last crevasse (that at Conrad Point, below Baton Rouge) was completed on the night of the 7th. As fast as the water receded from the overflowed lands planting operations were resumed, and by the middle of the month all lands that had been under water had been replanted. Crops on these overflowed lands are promising at the close of the month.

Heavy local rains having fallen on several days during the first half of the month, sharp rises of short duration distinguished the upper portion of the Red River; the lower stream was devoid of interesting features, a gradual decrease having been maintained nearly the entire period. At Shreveport the month opened with a stage of 13.9 feet and closed with one of 9.8 feet.

A local rise of 10 feet in the Ouachita at Camden between the 3d and 7th, and the corresponding fall at that point, within a week thereafter left the upper Ouachita at a low stage during the greater portion of the month. The lower Ouachita fell rapidly during the entire month, the fall at Monroe amounting to about 19 feet between the 1st and the close of the month. Navigation continued in the Red and lower Ouachita during the entire month.

Missouri River and branches. (Reported by L. A. Welsh, Omaha, Nebr., and P. Connor, Kansas City, Mo.)—There has been no unusual stage of water in the Missouri River during the month. While the stage of water has been slightly above the normal, it has remained remarkably steady for this season of the year. The river was highest during the first half of the month, and fell very slowly during the last half. The entire range for the month was only 2 feet at Omaha. The river is making serious inroads upon the farm lands lying south of Manawa, which is about 5 miles south of Omaha, on the Iowa side. At one point the river cut inland a distance of 30 rods during the week from the 12th to the 19th, carrying with it hundreds of acres of the finest farm lands in the State. The cut is directly south of Manawa, where the river bends to the east. Last season more than 1,500 acres of valuable farm land, lying between Council Bluffs and Manawa, went into the river, and the people are very much alarmed to see the cutting process resumed this season. The riprap work on the east bank of the Missouri at Plattsmouth, done by the Burlington and Missouri Railroad Company, is reported to have checked the cutting at that point, and it is expected that the railroad company will do further work during the coming winter.

At Kansas City a moderately high stage was maintained all the month, fluctuating between 13.9 and 17.6 feet. A fortunate circumstance for this locality was that the excessive rains of the latter part of the month occurred in a belt from 100 to 200 miles south of the tributaries which affect the stage at this place; otherwise, there would have been another serious flood.

Arkansas River. (Reported by J. J. O'Donnell, Fort Smith, Ark., and F. H. Clarke, Little Rock, Ark.)—Westward from Fort Smith to Webbers Falls the Arkansas River was navigable during the month, falling steadily from the 5th to the 15th. On the morning of the 16th a rise of 0.2 feet was recorded, and a further rise of 4.8 feet on the 17th, after which the river again fell steadily to the close of the month, when the gauge registered 4.0, the lowest since February 6.

The river continued at a good boating stage from Fort Smith to the mouth throughout the entire month, and navigation was pursued uninterruptedly. A very uniform stage prevailed, there being no marked rises or falls, particularly in the lower river. The most marked rises were 3.0 feet at Dardanelle on the 18th and the same at Little Rock on the 20th.

Rivers on the Pacific Coast. (Reported by W. H. Hammon, San Francisco, Cal.; J. A. Barwick, Sacramento, Cal.; and B. S. Pague, Portland, Oreg.)—During the first part of the month the lower San Joaquin was high, owing to the melting of the snow in the mountains, but no damage resulted from the high water. The river is now about normal and is falling slowly.

There was a steady decline of the Sacramento river up to the 20th, when a storm passed over this section, lasting three days. During this time there were rains over the headwaters of the Sacramento river and its tributaries heavy enough to cause a rise from 14.3 feet on the 20th to 15.2 feet on the 23d. Since the latter date the river has steadily fallen.

The high waters which prevailed in May continued to decrease until the close of June. Owing to the warm weather of April and May over the Pacific Northwest, the rise in the Columbia and tributaries occurred much earlier than usual; as a rule, the highest water occurs about June 15. On the Willamette above Oregon City the river has fallen to a lower stage than is usual at this period of the year, making it somewhat difficult to navigate. The smaller streams have all furnished plenty of water for irrigation and mining purposes.

Heights of rivers above zeros of gauges, June, 1897.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	1,907	14	6.8	23	5.2	1	6.0	1.6
Reeds Landing, Minn.	1,887	12	6.7	22,23	4.3	2,4	5.6	2.4
La Crosse, Wis.	1,822	10	8.1	25–27	5.8	5	7.1	2.3
North McGregor, Iowa	1,762	18	9.0	29,30	6.3	8	7.6	2.7
Dubuque, Iowa	1,702	15	8.8	30	6.1	9	7.4	2.7
Leclaire, Iowa	1,612	10	5.4	29,30	4.0	11	4.8	1.4
Davenport, Iowa	1,596	15	6.8	25,26,30	5.0	11	5.9	1.8
Keokuk, Iowa	1,466	14	6.6	28,29	4.8	13,14	5.7	1.8
Hannibal, Mo	1,406	17	8.2	26	5.9	15	6.9	2.3
Grafton, Ill	1,307	23	11.1	30	7.3	16–19	8.5	3.8
St. Louis, Mo. †	1,264	30	21.8	30	14.4	22	16.2	7.4
Chester, Ill.	1,189	30	15.3	30	10.7	17,18,21	11.9	4.6
Cairo, Ill	1,073	40	23.2	30	16.6	17–19	18.9	6.6
Memphis, Tenn	843	33	17.2	1	11.8	20,21	13.6	5.4
Helena, Ark	767	44	26.8	1	16.7	22	19.7	10.1
Arkansas City, Ark.	635	42	34.0	1	17.8	22	22.0	16.2
Greenville, Miss	595	40	29.6	1	14.5	22	18.3	15.1
Vicksburg, Miss	474	41	43.4	1	18.1	28–30	27.7	25.3
New Orleans, La	108	16	18.0	1	7.2	29,30	12.8	10.8
Arkansas River.								
Fort Smith, Ark.	345	22	10.8	17	4.0	30	6.4	6.8
Dardanelle, Ark.	250	21	9.2	19	3.0	29,30	5.6	6.2
Little Rock, Ark.	170	23	10.3	20	5.3	29,30	7.5	5.0
White River.								
Newport, Ark	150	21	4.3	22	2.8	29,30	3.6	1.5
Illinois River.								
Peoria, Ill.	135	14	9.6	28	5.0	14,15	6.6	4.6
Missouri River.								
Bismarck, N. Dak.	1,201	14	8.9	6	6.9	27	7.8	2.0
Pierre, S. Dak.	1,006	14	8.6	1,2	6.6	16	7.6	2.0
Sioux City, Iowa	676	19	12.1	1	10.3	30	11.0	1.8
Omaha, Nebr.	561	18	12.6	3	10.7	20,21	11.7	1.9
St. Joseph, Mo.	373	10	9.1	5	6.9	22,23	8.0	2.2
Kansas City, Mo.	280	21	17.6	6	13.9	23–25	15.9	3.7
Boonville, Mo.	191	20	15.8	29	11.5	1	13.3	4.3
Hermann, Mo.	95	21	13.2	29	7.4	1	9.4	5.8
Ohio River.								
Pittsburg, Pa.	966	22	6.7	23	1.7	3,4,7	4.2	5.0
Davis Island Dam, Pa.	950	25	5.7	20	2.7	30	4.3	3.0
Wheeling, W. Va.	875	36	7.9	9	3.6	30	5.2	4.3
Marietta, Ohio.	795	25	8.0	10	4.4	29	5.8	3.6
Parkersburg, W. Va.	785	35	9.0	21	5.0	29	6.9	4.0
Point Pleasant, W. Va.	708	36	14.4	21	3.7	30	6.7	10.7
Catlettsburg, Ky	651	50	19.8	22	5.0	7,8	9.6	14.8
Portsmouth, Ohio	612	50	19.7	22	7.0	8	10.8	12.7
Cincinnati, Ohio.	499	45	30.7	24	9.0	9,10	12.8	11.7
Louisville, Ky.	367	24	8.3	25	4.8	10–12	6.1	3.5
Evansville, Ind	184	30	14.1	28	6.1	13,14	9.1	8.0
Mount Vernon, Ind. ‡	148	35	14.0	28	7.6	18	10.1	6.4
Paducah, Ky.	47	40	12.0	29,30	5.9	16	8.0	6.1

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Alleghany River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Warren, Pa.	177	7	0.5	9	0.0	19–30	0.1	0.5
Oil City, Pa.	123	13	2.2	9	0.6	28–30	1.2	1.6
Parkers Landing, Pa.	73	20	2.6	9,10	0.8	{25, 26, 29, 30}	1.3	1.8
Freeport, Pa.	26	20	4.4	10	1.4	30	2.5	3.0
Conemaugh River.								
Johnstown, Pa.	64	7	2.0	18	1.0	30	1.4	1.0
Red Bank Creek.								
Brookville, Pa.	35	8	0.1	25	— 1.1	2–17	—0.9	1.2
Beaver River.								
Ellwood Junction, Pa.	10	14	3.6	8	— 0.1	29	0.5	3.7
Big Sandy River.								
Louisa, Ky.	26	20	12.0	20	3.4	6,7	6.3	8.6
Cumberland River.								
Burnside, Ky	434	50	4.0	28	0.5	18	1.6	3.5
Carthage, Tenn.	257	30	4.0	30	1.7	19	2.3	2.3
Nashville, Tenn	175	40	4.7	30	2.2	21	3.1	2.5
Great Kanawha River.								
Charleston, W. Va.	61	30	10.1	21	3.8	29	5.5	6.3
New River.								
Radford, Va.	153	14	1.5	10	0.3	19,20,30	0.6	1.2
Hinton, W. Va.	95	14	3.1	10	1.6	30	2.2	1.5
Licking River.								
Falmouth, Ky.	30	25	6.5	26	0.8	15,16	2.1	5.7
Miami River.								
Dayton, Ohio	69	18	3.1	19	1.3	17,18	1.7	1.8
Monongahela River.								
Weston, W. Va.	161	18						
Fairmont, W. Va.	119	25	4.4	22	— 0.2	6–10	1.2	4.6
Morgantown, W. Va.	95	20	10.2	22	7.0	{3, 6–8, 11–13, 30}	7.7	3.2
Greensboro, Pa.	81	18	10.2	22	7.2	30	8.1	3.0
Lock No. 4, Pa.	40	28	10.5	22	6.5	{1–3, 7, 8, 11–14, 30}	7.5	4.0
Cheat River.								
Rowlesburg, W. Va.	36	14	6.0	21	2.0	30	3.3	4.0
Youghiogheny River.								
Confluence, Pa.	59	10	1.8	4,5	0.7	28–30	1.1	1.1
West Newton, Pa.	15	23	1.5	20	0.4	16,17	0.7	1.1
Tennessee River.								
Knoxville, Tenn.	614	29	4.4	24	1.7	19	2.9	2.7
Rockwood, Tenn	519	20						
Chattanooga, Tenn.	430	33	6.2	26,29	3.3	19,20	4.6	2.9
Bridgeport, Ala	390	24	4.7	29	1.7	20	2.8	3.0
Florence, Ala.	230	16	3.3	28,29	1.5	22,23	2.4	1.8
Johnsonville, Tenn.	94	21	4.8	30	2.9	24	4.0	1.9
Wabash River.								
Terre Haute, Ind.	165	16	10.2	21	1.7	17	3.8	8.5
Mt. Carmel, Ill.	50	15	8.5	23	3.3	20	4.7	5.2
Red River								
Arthur City, Tex.	688	27	14.0	19	3.5	14	7.7	10.5
Fulton, Ark	565	28	16.8	21	7.5	30	12.0	9.3
Shreveport, La.	449	29	13.9	1	9.8	30	12.1	4.1
Alexandria, La.	139	33	17.5	1	10.0	30	13.8	7.5
Atchafalaya River.								
Melville, La.	100*	31	35.2	1	23.0	30	30.4	12.2
Ouachita River.								
Camden, Ark.	340	39	14.1	7	4.1	29,30	6.4	10.0
Monroe, La	100	40	28.2	1	8.9	30	20.7	19.3
Yazoo River.								
Yazoo City, Miss.	80	25	27.5	1	0.9	30	15.1	26.6
Tombigbee River.								
Columbus, Miss.	285	33	— 1.6	4	— 2.9	30	—2.4	1.3
Demopolis, Ala.	155	35	2.7	6	— 1.4	30	0.2	4.1
Black Warrior River.								
Cordova, Ala	155	20	2.0	1,2,5–7	0.6	29,30	1.4	1.4
Tuscaloosa, Ala.	90	38	3.4	7	— 0.1	30	1.2	3.5
Alabama River.								
Montgomery, Ala.	265	35	2.0	8,9	0.5	30	1.4	1.5
Selma, Ala.	212	35	2.3	1	0.8	30	1.5	1.5
Coosa River.								
Rome, Ga	225	30						
Wilsonville, Ala	66	15						
Savannah River.								
Augusta, Ga	130	32	11.7	10	5.9	29	7.5	5.8
Edisto River.								
Edisto, S. C	75	6	4.5	11	1.4	2–5	2.8	3.1
Congaree River.								
Columbia, S. C.	37	15	10.7	9	1.5	1–4, 13–30	2.4	9.2
Santee River.								
St. Stephens, S. C.	50	12	8.3	19–20	2.9	2	2.6	5.4
Wateree River.								
Camden, S. C.	45	24	20.0	9	4.2	30	6.6	15.8
Black River.								
Kingstree, S. C.	60	12	4.2	11	1.8	29	3.2	2.4
Pedee River.								
Cheraw, S. C.	145	27	16.0	9	2.4	27	4.5	13.6
Lynch Creek.								
Effingham, S. C	35	12	8.0	17	3.1	4	5.1	4.9
Lumber River.								
Fair Bluff, N. C	10	6	4.2	15	0.7	2,3,30	2.2	3.5
Waccamaw River.								
Conway, S. C	40	7	3.5	19	1.4	26	2.6	2.1
Cape Fear River.								
Fayetteville, N. C.	100	38	8.6	2	1.8	25	4.5	6.8
James River.								
Lynchburg, Va.	257	18	1.6	20	0.3	30	0.9	1.3
Richmond, Va.	110	12	1.0	7,19	— 0.2	16,29	0.3	1.2
Potomac River.								
Harpers Ferry, W. Va.	170	16	1.4	{1, 2, 10, 22, 23}	1.0	{15–19, 29, 30}	1.2	0.4
Susquehanna River.								
Wilkesbarre, Pa.	178	14						
Harrisburg, Pa.	70	17	3.5	14	1.5	30	2.4	2.0

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
W. Br. of Susquehanna.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Lock Haven, Pa	63	10	1.0	1,2	0.3	16-23	0.6	0.7
Williamsport, Pa	35	20	2.4	4	1.0	30	1.5	1.4
Juniata River.								
Huntingdon, Pa	80	24	3.5	1,21	3.0	11-20, 22-24, 26-30	3.1	0.5
Sacramento River.								
Redbluff, Cal	241	23	2.9	21	1.0	14-18, 27-30	1.6	1.9
Sacramento, Cal	70	25	19.6	1	13.9	30	16.0	5.7

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Willamette River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Eugene, Oreg	149	10	4.4	27	2.6	12-14	3.2	1.8
Albany, Oreg	99	20	4.3	28	2.6	12-14	3.2	1.7
Salem, Oreg	69	20	4.2	28	2.6	10-16	3.2	1.6
Portland, Oreg	10	15	22.8	1,2	15.0	19,26-30	17.9	7.8

* Distance to the Gulf of Mexico. † Record for 29 days. ‡ Record for 19 days.

SPECIAL CONTRIBUTIONS.

RECENT PUBLICATIONS.

By HERMAN W. SMITH, Librarian, Weather Bureau.

Argentine Republic.—Los Cereales y Oleaginosos Trillados en la Provincia de Buenos Aires en la Cosecha de 1895-1896. La Plata, 1896, 4to. lxxxiii, 64 pp. 13 chs.

Austria-Hungary.—Rapporto Annuale dell Osservatorio Astronomico-Meteorologico di Trieste per l'anno 1894. Trieste, 1897. 4to. 114 pp.

Frejlach, Dr. Josef. Prispevek K. Poznani Nefometrickych Pomeru Zemi Hercynsko-Sudetskych. Prag, 1897. 8vo. 24 pp. 3 chs.

British Empire.—Marriott, William. Hints to meteorological observers, with instructions for taking observations, and tables for their reduction. London, 1897. 8vo. 47 pp.

Annual Report of the Geological Survey of Canada. Vol. VIII. Ottawa, 1897. 8vo. 998 pp. 6 maps.

Cook, John. Report on rain-fall registration in Mysore for 1895. Bangalore, 1896. 4to. 35 pp. 1 ch.

France.—Plumandon, J. R.—Les Gelées: Moyens de les Prévoir et d'en préserver les Récoltes. Paris, 1895. 8vo. 23 pp.

German Empire.—Bergholz, Dr. Paul. Deutsches Meteorologisches Jahrbuch für 1896. Freie Hansastadt Bremen. Bremen, 1897. 4to. xii, 125 pp.

Ergebnisse der untersuchungen der Hochwasserverhältnisse im Deutschen Rheingebiet, bearbeitet und herausgegeben von dem Centralbureau für Meteorologie und Hydrographie im Grossherzogthum Baden. 3 and 4 Heft. Berlin, 1897. 14 x 10. vi, 148 pp. 15 chs.

Deutsches Meteorologisches Jahrbuch Jahrgang 1895. Meteorologische Beobachtungen in Württemberg. Stuttgart, 1897. 4to. 94 pp. 7 chs.

Königlich Preussisches Meteorologisches Institut. Ergebnisse der Niederschlags-Beobachtungen im Jahre 1894. Berlin, 1897. 4to. 205 pp. 3 chs.

Aus dem Archiv der Deutschen Seewarte. xix Jahrgang: 1896. 4to. 148 pp. 1 ch. 2 tabs. and 2 diagrams.

Contains Memoirs by the following:
E. Knipping, 44 pp.
Die Direction, 6 pp.
Carl Stechert, 41 pp.
E. Engelenburg, 51 pp.

Italy.—Agamennone, G. Il Tromometro Fotografico. Modena, 1897. 8 vo. 17 pp.

Agamennone, G. Vitesse de Propagation du Tremblement de Terre d'Amed (Asie M.) du 16 avril 1896. Modena, 1897. 8 vo. 20 pp.

Sweden.—Meteorologiska Iakttagelser i Sverige. Vol. 33, 1891. Stockholm, 1895. 4to. viii, 155 pp.

United States of America.

District of Columbia.

Bolton, Henry Carrington. A catalogue of scientific and technical periodicals 1665-1895. Second edition, Part II. Smithsonian miscellaneous collections. Washington, 1897. 8vo. Pp. 603-1015.

Report of the Mississippi River Commission to the Secretary of War. Stages of the Mississippi River and of its principal tributaries. Washington, 1896. 8vo. xli, 56 pp.

Kansas.—Report of the Board of Irrigation Survey and Experiment for 1895 and 1896. Topeka, 1897. 8vo. 238 pp. 24 pls.

Maine.—Proceedings of the Portland Society of Natural History, Vol. II, Part 4. Portland, 1897. 8vo. Pp. 97-137.

Ohio.—Cleveland Public Library. Cumulative Index to a selected list of periodicals. Authors, Subjects, Titles, Reviews, Portraits. Vol. 1, 1896. Cleveland, 1897. 4to. 384 pp.

Pennsylvania.—Auchincloss, W. S. Water within the Earth and laws of rainflow. Philadelphia, 1897. 8vo. 43 pp.

TEMPERATURE AND RAINFALL AT MERSIVAN, TURKEY.

The following table of monthly and annual means gives the results of observations made under the direction of J. J. Manissadjian, Professor of Physical Science, Anatolia College, Merzifun (Mersivan or Marsovan), Turkey in Asia. The location of the observatory is: Latitude 40° 50′ N., longitude 35° 40′ E. The temperatures were observed at 8 a. m., 1:15 p. m., and 6:30 p. m., besides the daily maximum and minimum. No details are given as to the method followed in combining these observations so as to obtain daily and monthly mean temperatures. Owing to the high mountains north and east of the station, the climate must be quite local in its characteristics.

Month.	Mean temperature.						Extreme temperatures.				Total rainfall.			
							Maxima.		Minima.					
	1892.	1893.	1894.	1895.	1896.	Mean.	Temperature.	Date.	Temperature.	Date.	1896.	1896.	1897.	Mean.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.		°C.		mm.	mm.	mm.	mm.
Jan.	2.2	2.1	0.5	6.5	0.6	2.4	22.5	30, '95	−14	31, '93	.....	10.1	24.1	17.1
Feb.	2.7	−1.1	0.2	6.4	0.5	1.7	19	14, '95	−19	10, '93	.....	3.9	26.7	15.3
March	8.2	4.7	5.4	6.5	5.5	6.1	22	22, '96	− 6	24, '93	.....	31.0	24.4	27.7
April	9.0	5.0	11.2	10.6	9.3	9.0	25	30, '96	− 6	3, '93	.....	37.3	56.4	46.8
May	13.5	16.2	17.8	13.6	15.5	15.3	32.5	28, '95	+ 2	1, '96	.....	93.8	91.2	92.5
June	18.8	19.6	20.3	19.1	20.3	19.4	35	12, '96	7.5	1, '95	44.2	70.7	...	57.4
July	20.0	23.0	21.9	23.5	22.8	22.2	34	9, '95	3.0	3, '92	.....	32.2	.....	32.2
August	20.4	21.8	22.0	22.9	24.5	22.3	37.5	6, '95	9.5	30, '95	21.6	10.1	.....	15.8
Sept.	18.1	17.4	17.2	16.3	20.4	17.9	32.5	8, '94	2.5	24, '95	40.4	59.8	.....	50.1
Oct.	16.9	14.7	16.9	15.8	17.4	16.3	31	26, '92	1	27, '93	40.9	8.8	.....	24.8
Nov.	7.2	11.3	6.7	9.3	8.9	8.6	26	7, '93	− 5.5	28, '92	6.8	47.9	.....	27.4
Dec.	5.1	4.1	3.5	5.2	4.8	4.6	20	2, '96	− 9	3, '96	13.5	19.4	.....	16.4
Means	11.7	11.9	12.0	13.2	12.6	12.3	.....	.....	.....	.....	.....	427.0	.....	434.5

Temperature extremes: Maximum, 37.5°, August 6, 1895; minimum, −19°, February 10, 1893.

WHIRLING ALTO-STRATUS.

By Mr. ALEXANDER G. MCADIE, Local Forecast Official (dated March 15, 1897).

Accompanying this are two photographs (see attached plate) of a whirling alto-stratus cloud which appeared over San Francisco on February 20, 1897, at 12 m. (seventy-fifth meridian time?). About thirty seconds elapsed between the two pho-

tographs. It is thought that the whirling motion is apparent. A fluid color screen and Seed plate were used. Rain had fallen in the twelve hours preceding the time of photographing this cloud at San Francisco and generally throughout California. In the clearing weather which temporarily followed heavy frost occurred. One hour previous to the time of taking these photographs the sky was free of clouds, excepting a few alto-strati passing from northwest to southeast. The wind was north, the pressure rising rapidly (0.08 in two hours), and in the valleys back of San Francisco the skies were clear. Clouds, mostly of the cumulus formation, were in sight. Two hundred and fifty miles south of San Francisco rain was falling; temperature 42°, and farther south it was even colder.

Two hours after taking the photographs the sky at San Francisco was again cloudy, the barometer falling rapidly, and rain reported 15 miles to the north. In the San Joaquin Valley at this time heavy cumulus clouds were moving rapidly from the northwest. Through southern California and Arizona it was overcast and raining. Five hours later there had been light rain at San Francisco, snow in Nevada, and dense cumulus clouds resting on the mountains, rain falling generally in California, and strong westerly winds in southern California. Killing frosts were reported generally in California at the next morning's observations after these photographs were taken.

THE PROBLEM OF THE KITE.[1]

By Mr. ALEXANDER G. MCADIE, Local Forecast Official (dated December, 1896).

There are two general classes of bodies which traverse or navigate the air; first, there are those which float or soar, without any apparent expenditure of energy; and second, those which swim or force a way through the atmosphere. Flying machines, birds when using their wings, and all aerodromes or air runners belong to the second class, expending energy in their flight. Balloons when drifting, kites, aeroplanes, and soaring birds belong to the first class. It is therefore, with the kite, as an inert body wholly immersed in air, and not rising or falling because of any acquired or inherent energy of its own that we shall have to deal, in this paper. Indeed, the more general way of treating this subject is to consider the kite as a disturbing factor in air motion. The atmosphere is a mechanical mixture of certain gases. As a whole, it is subject to certain forces and is in motion. Into this fluid, with all its varying stresses, we introduce a disturbing mobile plane. We are to investigate the forces acting in the vicinity of this plane surface. We shall have to consider the pressure of the wind upon both kite and kite line at every point, the restraining pull of the kite line, the attraction of gravity upon kite and line, the peculiar resultant forces which sometimes make a kite with a given initial velocity rise apparently without wind pressure and in opposition to gravity, and, finally, the friction of the air upon the kite surface. The form of the surface exposed must be discussed and the relative value of different presentations of area to wind, whether steady or gusty, given. Almost all the kites in popular use to-day have plane and regular surfaces. We have the plane malay kites and modifications, combination planes with dihedral angles, and cellular or Hargrave kites. Curved areas have not yet come into general use, although unquestionably possessing

Our mobile body, whatever its form may be, is into air either when the flow is continuous, th steady wind, or when the flow is intermittent, being spent in variable pulses. Indeed the prob kite may be likened to that of a plane free to mo direction, immersed in a reservoir of flowing wat further disturbed by a number of dashers out of s from the difference in specific gravity, the plane w upward motion due to the component of steady fl effect of the countercurrent. It is, perhaps, well size the fact that a plane or a kite will worm its w when the inclination of the axis changes respe aerial puffs and pulsations. (See Professor Lan memoirs, viz, Experiments in Aerodynamics, and, nal Work of the Wind).

Everyone who has flown kites is familiar with th it is easier to get the kites into the upper air whe air comes in rapid puffs than when the air moves the velocity, as indicated by a Robinson anemom the same in both cases. An anemo-cinemograph given us a record whence the relative gustiness (f a better term) could have been shown. It is well k the Robinson anemometer smooths out this fact illustration of the fact that a kite can be raised what appears to be a wind of less velocity, we cit of some kites flown on August 20, 1896. At abo the velocity of the wind was 12 miles per hour at t and the kites were decidedly higher than at 3 p. m wind at the surface was 16 miles per hour. It m pointed out that one of the great advantages of f in tandem arises from the changed inclination o to the planes. An example will, perhaps, bring thi plainly.

On August 28, 1896, two cellular kites were flown at ————. The following table gives the prin obtained:

Length of kite wire.		Angle.	Elevation.		Changes.	
Feet.	Meters.		Feet.	Meters.	Length.	Heig
		° ′			*Meters.*	*Met*
6,656	1,998	32 45	3,640	1,109	.....	.....
6,021	1,835	35	3,450	1,052	−163	−5
5,640	1,719	39 30	3,550	1,082	−116	+3
5,190	1,582	44	3,600	1,097	−137	+1
4,623	1,409	48	3,450	1,082	−173	−1
4,114	1,253	54	3,300	1,006	−156	−7
3,860	1,176	57	3,230	984	− 74	−2
3,882	1,122	59	3,185	970	− 54	−1

From the above it appears that while the line pulled in evenly the kite descended 57 meters fo 163 meters of line, or fell nearly 1 meter for ever of line. But 500 feet lower in the air we get a meters for 54 meters of line. But note that afte fall the kite, owing to the pull along the line, gain tion, and this gain was probably independent of a in wind direction and velocity, although, as we sha ther on, the lower kites did indicate wind current from those above. The experiment is of course im that we were not able to measure the wind pressu different altitudes. The wind velocity at the grou time the highest elevation was made (4:10 p. m.) appreciable change.

The first of the forces acting in kite work is the the string or line, or, as it is generally called, the we see in the above illustration how increasing th along the line results in an increased elevation, pro pressure of the wind on the surface of the kite and

[1] In accordance with the policy of publishing the views of all who have written on the theory of the kite, the Editor, in the last number of the MONTHLY WEATHER REVIEW, presented a rather lengthy memoir by Prof. C. F. Marvin. In continuation of the same subject he submits the following extracts from a memoir by Mr. Alexander G. McAdie. As Mr. McAdie's memoir embraced other matters than the strictly mechanical theory, these extracts may seem disconnected but they are believed to express fully the views presented by him.

possessing certain ad-

n may be, is introduced
ntinuous, the so-called
termittent, the energy
ed the problem of the
e free to move in every
flowing water which is
ers out of step. Aside
the plane will have an
of steady flow and the
erhaps, well to empha-
l worm its way upward
anges responsively to
rofessor Langley's two
namics, and, The Inter-

iliar with the fact that
per air when the lower
e air moves uniformly,
son anemometer, being
nemograph would have
gustiness (for want of
It is well known that
ut this factor. As an
n be raised higher in
ocity, we cite the case
96. At about 11 a. m.
er hour at the surface,
an at 3 p. m., when the
hour. It must also be
antages of flying kites
nclination of the wind
ps, bring this out more

s were flown in tandem
ves the principal data

	Changes.	
s.	Length.	Height.
	Meters.	*Meters.*
	−163	−57
	−116	+30
	−137	+15
	−173	−15
	−156	−76
	− 74	−22
	− 54	−14

ile the line was being
7 meters for the first
ter for every 3 meters
ir we get a fall of 14
te that after the first
ne line, gains in eleva-
endent of any change
h, as we shall see fur-
ind currents different
of course imperfect, in
wind pressure at the
at the ground at the
: 10 p. m.) showed no

work is the *tension* of
called, the *pull*. And
ncreasing the tension
evation, provided the
the kite and the force

WHIRLING ALTO-STRATUS

WHIRLING ALTO-STRATUS

of gravity on the ma
librium. In the effo
and if the forces ar
upward. The resulta
is balanced against th
by increasing the te
elevation was reached
four conditions in the
First, where the two
sultant force to the
that of the tension; s
resultant may yet ch
tion of the line may
and resultant may ch

On September 14, 1
The weather was so
was so great that it w
reel and wire. When
so short a period as
inch in length were o

Length o	
Feet.	
2,347	
1,993	
1,739	
1,485	
1,231	
977	
723	

On September 19, 1
with the following res

Length o	
Feet.	
7,516	
6,316	
5,452	
4,465	

At a height of 4,000
appeared into a layer o
sky. At other times i
partially clouded that i
a little, and on the oth
to enter a bally cumul

We are now ready to
types of kites beginnin
The customary rigging
was generally obtained
kite were of large di
material. Occasionall
and pieces of wood we
occasion, the writer rec
atory, a pair of blue fla
and if memory is corre
air for some time. A
effective area as well as
Archibald has taken a
had been abandoned as
cal wind carriers in th
the kite up. With the
face opposed to a given
elevation upon the bala
the line tension, and th
tail. If the kite is to r
upward component forc
tion is constant. The

on the mass are not thrown too much out of equi- In the effort to restore equilibrium, the kite moves, e forces are properly balanced the motion will be The resultant effect of the wind pressure and gravity d against the line tension. We have even seen how, ing the tension and shortening the line, a greater vas reached. * * * Roughly speaking, there are tions in the balancing of the tension and resultant: re the two are equal and the inclination of the re- rce to the normal is exactly 180° different from e tension; second, assuming constant kite areas, the may yet change in inclination; third, the inclina- e line may be changed; and, finally, both tension ant may change.

ember 14, 1896, three large cellular kites were flown. ner was somewhat cloudy, and the electrification at that it was necessary to ground thoroughly the ire. When the ground wire was removed for even period as ten seconds, sparks one-quarter of an ngth were obtained.

Length of wire.		Angle.	Elevation.	
Feet.	Meters.		Feet.	Meters.
2,247	683	° 29	1,100	338
1,993	606	32	1,060	323
1,739	530	38	1,080	329
1,485	454	43	1,045	318
1,231	375	52	1,020	311
977	299	50	760	232
723	219	52	580	177

ember 19, 1896, cellular kites in tandem were flown llowing results:

Length of wire.		Angle.	Elevation.	
Feet.	Meters.		Feet.	Meters.
7,516	2,291	° 33	4,100	1,250
6,316	1,925	35	3,630	1,106
5,452	1,661	36	3,210	978
4,465	1,361	39	2,825	861

ght of 4,000 feet the uppermost kite repeatedly dis- nto a layer of cloud which covered nearly the whole ther times it has been noticed when the sky was louded that in the clear spaces the kites would drop d on the other hand rise when just below or about bally cumulus cloud.

now ready to resolve the forces acting upon various ites beginning with the old hexagonal tailed kite. nary rigging of this kite is well known. Stability lly obtained by means of a long tail, which, if the of large dimensions, was made of some weighty Occasionally when cloth was scarce, small stones of wood were tied to the tail. On one interesting he writer recalls sacrificing, at a well-known observ- ir of blue flannel trousers to make a tail for a kite, nory is correct the kite rose and remained in the he time. A tail may be of use in changing the ea as well as changing the center of gravity. Thus has taken a malay kite, which after repeated trials bandoned as a non-flyer, and by adding little coni- arriers in the form of tails, succeeded in sending . With the hexagonal kite we have a plane sur- d to a given wind pressure, and depending for its pon the balancing of the resultant wind pressure, sion, and the action of gravity on the kite and e kite is to rise, there must always be a balancing mponent force. Gravity is the one force whose ac- tant. The resultant wind pressure is a variable quantity, and the problem with the hexagonal (as with every form of kite) is well stated by Marvin in his paper (MONTHLY WEATHER REVIEW, May 1896, p. 158): "To so arrange the surfaces and bridle of the kite that it can promptly, constantly, and easily accommodate itself to the innumerable and often very great and sudden changes which we find occurring in the force and direction of the wind." By bridle we mean point of suspension or point of application of the line tension which force necessarily results from the other forces. Neglecting skin friction, which may vary with the material used, the wind pressure is exerted upon the kite at various angles as the wind stream lines are seldom constant. A resultant wind pressure is found by combining (by the parallelogram of forces) the pressures for the different directions. The point of application of this mean resultant wind pressure gives the center of pressure of the kite. This is not a fixed point but one that moves with changes in the wind pressure.

The center of surface or center of effective area and the center of gravity are self-explanatory terms. In order that the forces acting upon a hexagonal kite may be in equilibrium, the product of the component mean pressure normal to the kite and the distance between the centers of pressure and area must equal the component of gravity multiplied by the distance between the bridle point and center of gravity. In order to resolve all the forces acting upon an ordinary kite, namely, wind pressure upon surface, tail, and string, line tension, and the downward pull due to gravity, we should have data covering wind pressure per unit of area, line tension continuously recorded, and the kite dimensions in detail. Unfortunately kite flyers have not generally taken note of these, although they may have noted at the time the weights of kite and tail, and the area exposed to wind. The wind velocity at the ground, in miles per hour, may also have been noted. The wind pressure aloft, however, is an indeterminate quantity until sensitive recording anemometers are devised suitable for use at different levels in the air. * * * At this point it may be well to emphasize the instability of the wind pressure. Too much can not be said about it, inasmuch as it is the prime factor in kite flying. In some anemometer comparisons made by Fergusson (see Blue Hill Meteorological Observations, 1896, p. 287) there is given a tracing from a pressure plate in which the record paper was moved with a speed of 20 inches a minute in order to separate individual gusts. "It is only fair," says Fergusson, "to suppose that some of the oscillations are due to vibrations of the plate and not of the wind (also true in the case of kites), but by far the greater part are real changes in wind pressure, *and in some cases there are ten or more in one second*." * * * But the essential factor in determining the kite's elevation is the relative pressure upon the kite's area, as this area changes in inclination to the resultant mean wind. The pressure varies with different inclinations, and we saw at the beginning of this paper that it is possible for a kite to make altitude by rapid changes in the inclination

Inclination.	Proportional pressure.	Inclination.	Proportional pressure.
°	*Per cent.*	°	*Per cent.*
1	3.5	16	51.2
2	7.0	17	53.8
3	10.4	18	56.5
4	13.9	19	58.9
5	17.4	20	61.3
6	20.7	21	63.7
7	24.0	22	65.7
8	27.3	23	67.8
9	30.5	24	70.0
10	33.7	25	71.8
11	36.9	26	73.7
12	39.8	27	75.2
13	43.1	28	77.1
14	45.7	29	78.6
15	48.6	30	80.0

to the wind, even in light winds. Changes in the length and area of the tail, changes in the weight and proportions of the kite itself, changes in the bridle, all directly affect the centers of gravity and pressure of the whole system. When these are not in perfect equilibrium, diving results. To get the relative pressure upon inclined flat surfaces we have the accompanying table given by Chanute (Progress in Flying Machines) based upon Duchemin's formula.

Mr. A. M. Herring in his paper upon Dynamic Flight (The Aeronautical Annual) shows that the center of pressure, varying as it does with the inclination of the wind to the plane, must be constantly maintained above the center of weight of the kite if the kite is to fly, and in his judgment "the best solution is probably to be found in such surfaces and their arrangement relative to each other as will remain undisturbed by changes in the wind." * * * Mr. Herring says: "At almost all angles of inclination the center of pressure on a square plane is proportionately farther forward than is the center of pressure on a plane whose advancing edge is five times its breadth. Similarly, at slight angles, the center of pressure on a properly curved surface (whose vertical projection is square) is farther back than either. Another variation in the position of the center of pressure is that produced by speed. If a plane or slightly curved surface be held in a wind and be inclined at a very flat angle, its center of pressure will be found farther forward at high speed than at low." Again, Herring states that "the center of pressure on considerably curved surfaces undergoes a peculiar reversal in its position. For a surface in which the curvature is such that the rise of arc is about one-eighth the cord length, and where the highest point of curvature is one-third the way from the front, the maximum forward position of the center of pressure is found when the surface is tilted at about five degrees; it however travels rapidly backward for either a lesser or greater inclination of the cord."

CLIMATE OF ALASKA.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The statistics of temperature of central and interior Alaska given below are of especial interest at the present time. The climate of the coast is comparatively well known chiefly through the compilation of Dr. William H. Dall, published in the Pacific Coast Pilot, Alaska, Appendix I, Meteorology and Bibliography, Washington, 1879.

The chain of coast stations in Alaska maintained by the Signal Service (now Weather Bureau) was extended up the Yukon in the fall of 1882, and a few fragmentary series of meteorological observations were maintained at the trading posts of the Alaska Commercial Company during the closed season. As soon as the ice went out of the river observations were discontinued, not to be resumed until the end of the open season about the middle of September. The observing stations, with their geographical coordinates, are given below: The names of the stations are those now in use, with the following exceptions—Nuklukayet is given on the most recent Coast Survey map of Alaska as "Tuklukyet." The post is but a few miles below the junction of the Yukon and Tanana rivers; indeed, it is not certain but that observations were made at the mouth of the Tanana for a portion of the time. Tchatowklin was known in 1883 as Johnny's Village or Klat-ol-Klin (Schwatka). The Coast Survey map gives the name as "Belle Isle." Camp Colonna, the station on the Porcupine River at its intersection with the one hundred and forty-first meridian, was occupied by the boundary survey party sent out by the United States Coast and Geodetic Survey, under the leadership of Mr. J. H. Turner. Camp Davidson is the station at the intersection of the one hundred and forty-first meridian and the Yukon. It was occupied by a Coast Survey party under the charge of Mr. J. E. McGrath.

Monthly and annual mean temperature (in degrees Fahrenheit).

MEAN TEMPERATURE.

Stations.	Latitude.	Longitude.	Elevation.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.	Length of record. From—	Length of record. To—	Yrs.	Mos.
Coast.	° ′	° ′	*Feet.*	°	°	°	°	°	°	°	°	°	°	°	°	°				
Fort Wrangell	56 30	132 28	25-35	26.2	30.8	31.6	42.7	49.3	55.3	58.2	57.5	52.3	45.9	33.5	32.8	43.0	May, 1868	Aug., 1882	4	18
Sitka*	57 03	131 19	63	31.4	32.9	35.6	40.8	47.0	52.4	55.4	55.9	51.5	44.9	38.1	33.3	43.3	Jan., 1828	Dec., 1876	45	2
Sitka†	.....	.....	.....	34.2	33.0	37.2	41.9	46.9	51.6	54.4	56.6	52.3	45.7	39.8	36.0	44.5	April, 1881	Sept., 1887	5	18
Killisnoo‡	57 22	134 29	.....	26.7	26.9	33.3	35.5	44.9	50.3	54.8	53.6	46.5	41.2	32.7	30.6	39.8	May, 1881	Dec., 1896	11	25
Juneau	58 19	134 28	.....	27.5	24.7	33.5	40.1	47.7	53.6	56.6	55.0	49.9	41.9	31.2	29.3	40.9	May, 1883	Dec., 1896	2	28
Kadiak	57 48	152 19	.....	30.0	28.2	32.6	36.3	43.2	49.5	54.7	55.2	50.0	42.3	34.7	30.5	40.6	Jan., 1869	Aug., 1896	8	54
Unalaska*	53 53	166 32	13	30.0	31.9	30.4	35.6	40.9	46.3	50.6	51.9	45.5	37.6	33.6	30.1	38.7	Oct., 1827	April, 1868	6	30
Unalaska†	53 54	166 34	13	33.5	30.5	32.6	35.2	40.4	45.9	49.6	50.3	46.0	40.4	34.6	32.8	39.3	June, 1872	May, 1886	2	33
St. Michaels	63 28	161 48	30	7.4	— 2.3	8.9	19.9	33.1	46.3	53.6	51.9	43.9	30.5	15.6	4.8	26.1	July, 1874	June, 1886	11	12
Point Barrow	71 22	156 16	.....	—17.5	—18.6	—11.8	— 1.2	21.4	32.8	38.1	37.9	27.8	4.4	—6.0	—15.4	7.7	Sept., 1852	Aug., 1883	3	10
Interior.																				
Anvik	62 37	160 08	.....	1.8	1.3	15.5	25.4	42.0	.....	.....	....	43.0	25.1	10.0	— 2.1	.....	Oct., 1882	Mar., 1891	....	31
Nuklukayet	65 10	152 45	.....	—11.1	— 9.0	6.7	22.2	43.7	.....	.....	54.4	43.4	25.9	—4.6	—19.9	.....	Aug., 1882	May, 1886	....	27
Fort Yukon	66 33	145 18	412	—29.5	—11.6	0.6	.....	41.3	.....	.....	... ..	.....	.....	.....	.....	.....	Jan., 1861	May, 1861	....	4
Tchatowklin	65 30	142 38	.....	—15.8	—11.3	11.3	31.0	45.1	.....	.....	54.2	42.7	19.7	2.5	—15.0	.....	Oct., 1882	May, 1886	....	26
Fort Reliance	64 10	139 25	.....	—28.7	—19.7	10.5	28.7	43.9	.....	.....	.....	43.9	27.3	—7.0	—21.4	.....	Sept., 1882	May, 1886	....	16
Camp Davidson	.....	.....	.....	—17.4	— 9.9	7.1	23.6	45.0	57.2	60.3	52.1	39.0	30.5	2.9	—15.6	22.9	Sept., 1889	June, 1891	1	10
Camp Colonna	.....	.....	.....	—15.2	—15.3	— 8.0	6.4	41.0	51.9	.....	.....	.....	20.1	—4.4	—17.4	.....	Oct., 1889	June, 1890	....	9

EXTREMES OF TEMPERATURE—MAXIMUM.

Anvik	.....	.....	....	35	37	46	46	67	.....	.....	65	66	51	39	25	.....	.....	.....	....	....
Nuklukayet	....	.....	.....	35	38	46	52	72	.....	.....	79	72	54	36	17	.....	.....	.....	....	....
Tchatowklin	.....	.....	.....	17	33	56	62	82	.....	.....	80	78	59	39	39	.....	.....	.....	..	....
Fort Reliance	.....	.....	.....	20	37	45	59	76	.....	.....	.....	67	55	36	34	.....	.....	.....	....	....
Camp Davidson	.....	.....	.....	25	37	38	56	74	84	87	74	66	52	39	17	.....	.....	.....	....	....
Camp Colonna	.....	.....	.....	17	36	33	51	68	79	85	.....	.....	34	34	17	.....	.....	.....	....	....

EXTREMES OF TEMPERATURE—MINIMUM.

Anvik	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	....
Nuklukayet	.....	.....	.....	—76	—60	—38	—14	11	... ..	.....	28	12	—21	—53	—68	.....	.....	.....	....	....
Tchatowklin	.....	.....	.....	—75	—74	—56	—11	10	.....	.....	30	8	—28	—50	—68	.....	.....	.....	....	....
Fort Reliance	.....	.....	.....	—80	—72	—36	—10	16	.....	.....	.....	18	—11	—50	—69	.....	.....	.....	....	.. .
Camp Davidson	.....	.....	.....	—60	—55	—45	—26	8	30	35	31	14	4	—35	—49	.....	.....	.....	....	....
Camp Colonna	.....	.....	.....	—49	—47	—48	—28	15	26	36	.....	. ....	— 6	—36	—43	.. ...	.....	.....	....	....

NOTE.—The number of years during which observations were made continuously is given under the heading "Years." The total number of months, exclusive of the whole years, is given under the heading "Months." *Russian series. †Signal Service. ‡Means from 1889-1896, inclusive, used; means prior to that time not computed.

NOTES BY THE EDITOR.

RECORDS OF FOGGY AND CLOUDY DAYS.

Dr. A. C. Simonton, voluntary observer of the Weather Bureau at San Jose, Cal., calls attention to the fact that the blanks for weather reports from voluntary stations have no provision for reporting fog. This is an omission which he thinks ought not to exist. He says that it is just as important to report fogs as cloudiness; while fog lasts there is no sunshine, and yet we can not say that it is clear nor can we say that it is cloudy. Shall we report a foggy day as a clear day? At may points, especially near the ocean, there is much fog, and in climatological records this surely ought to be reported; it is certainly important for those studying the climate of distant regions to know whether there is more or less fog.

The compilers of the new edition of "Instructions" in their efforts to give the voluntary observers as little trouble as possible, have—not only in respect to fog, but in other matters—reduced the instructions and suggestions to the fewest possible words, and have omitted some subjects that, in special cases, may become important. The large majority of our observers never see the true ocean fog, but those who do experience it certainly have the privilege of substituting the word "foggy" for "cloudy," in describing the character of the day, on Form No. 1009.

These instructions were intended mostly for observers in agricultural districts, and it will often happen that observers in cities, or at sea, or on high mountains, or those in extreme northern and southern latitudes, will perceive that they must—in order to do good work—depart from the literal wording of this pamphlet. As is stated on the first page, "To render the meteorological observations taken throughout the United States of the greatest value and to facilitate their use in investigating questions relating to weather, it is important that a uniform sytem of taking and recording observations be adopted." It is evidently of the greatest importance that observations be taken on a uniform system at each station for many years, in order to obtain satisfactory normals, and the publication of the "Instructions of 1897" is not intended to disturb the uniform methods that many of our observers have maintained for so long a time.

HOMOGENEITY AND UNIFORMITY.

As uniformity at many stations over a large area is quite as important as uniformity at one station for many years, therefore, it would be eminently proper for those who have maintained such long records to consider whether—while still keeping up their integrity—they can not also do something additional that will make it possible to compare their own observations with those of distant stations without introducing discrepancies due to methods and instruments.

The most important sources of discrepancy may be enumerated as follows:

Temperature.—(A). A difference of a few feet in the height of thermometers above ground causes an apparent difference in the extreme temperatures at any two stations. (B). A difference in the style of exposure of a thermometer, one being hung on the north side of a house, too close to the wall; another swinging freely in the shade of a tree; a third put within a shelter of double lattice-work, where the wind has not the freest access; all these exposures will necessarily produce differences in recorded temperatures. (C). Unless thermometers are purchased of the best makers—and such are rather expensive—they are very apt to differ among themselves one or more degrees, F., even when stirred about together in a basin of water; the differences due to inclosures and instruments should be applied to the records before any study of climate is contemplated. (D). The differences in the immediate surroundings of two stations due to their being on hills or plains, in valleys or in the shadow of a mountain, or in a forest, will produce local peculiarities that are characteristic of very limited areas, and that must be duly considered in studying the peculiarities of climatic records; this question of special local climates, even in the narrowest possible sense of the word local, interests the botanist and agriculturist, because slight differences become appreciable in the growth of the plant.

Precipitation.—The records of rainfall show even wider variations, both absolutely and relatively, than do the records of temperature. The differences in temperature between two neighboring thermometers are paralleled by the differences in the catch of two local rain gauges. On the average of many years it is found that a rain gauge about a hundred feet above the ground will only catch 65 per cent of the rainfall caught by one at the ground, and it has been shown that this is simply due to the more active and violent action of the wind at the mouth of the upper gauge, since as soon as a gauge is shielded from the wind its record becomes the same whether it is one foot or a hundred feet above ground. For the same reason, gauges at or near the ground catch less in proportion as they are located in windy or sheltered spots; thus, in a set of fourteen gauges observed by Dr. Hellmann, near Berlin, in a region over which the average rainfall for the year must have been practically identical, some showed deviations of 14 per cent, which at first seemed to be due to the influence of forests, but were soon found to be simply the irregularities of the deficiencies in the catch of the rain gauge, being in fact in the nature of an error in the catch, due to the strength of the wind at the mouth of the gauge.

These paragraphs suffice to illustrate the extreme importance and difficulty of obtaining true temperatures and true rainfalls and the necessity of bearing in mind the uncertainties of our methods of observation and the incongruity of our data when we attempt to study minute peculiarities of climate.

It is hardly to be expected that the majority of the voluntary observers would care to devote that labor and thought to the subject which specialists in hygiene and climatology delight in, therefore the Weather Bureau avoids every appearance of imposing upon the voluntary observer, strictly so-called, the labor that many "special observers" willingly undergo for the sake of advancing the inquiries in which they are personally interested. It must, however, be recognized that every voluntary observer has, by the very fact that he voluntarily keeps a record, shown that he has some special interest in some part, if not the whole, of climatology. Therefore, to each one we may say: keep your record so that it shall be satisfactory to yourself in regard to the particular questions in which you are personally interested.

ELECTRICAL DISTRICTS.

Within the past few months several correspondents of the Weather Bureau have called attention to the fact that there exist here and there small and well-defined localities that are peculiarly subject to severe lightning strokes, and some explanation of this phenomenon has been requested. As

usual in such cases the main question is overlooked, viz, the clear and definite establishment of the fact. It is not sufficient to show that the lightning has struck several, or even many times within a limited radius, but one must show that it has not struck an equal number of times within the same area outside of that radius.

If the average of many years of observation shows that there really is a special frequency of lightning stroke in a limited region we have then to seek for the cause either near the ground or in the clouds. It is not likely that the cause consists in anything far below the surface of the ground. At the surface we know that tall trees, small hills, and tall buildings or monuments are most liable to be struck. As to the clouds we know too little about the cause of lightning to hazard any hypothesis. There are, however, three well established generalizations that will sometimes guide our investigations, viz, that thunderstorms are especially liable to begin in certain regions, that they pursue paths in directions radiating therefrom toward the east and northeast, and that they grow in severity up to a maximum at certain hours of the day. From these three principles it results that lightning will be most frequent along the favorite paths of thunderstorms and in those paths at certain hours of the day; if two favorite paths intersect, then the region of intersection will be especially rich in lightning strokes, provided that storms moving along these paths pass over that region at those hours of the day when the storm intensity is at a maximum.

Both from the practical point of view of the insurance companies, and from the philosophical point of view of the meteorologist, it is very desirable that we should have well established information relative to the distribution of lightning and thunderstorms, and the Editor will be pleased to publish a careful discussion of the complete record of all the lightning strokes that have fallen in any region as large as a township.

In conducting an investigation into the frequency of lightning, it is quite necessary to compare together equal areas; thus, it is often said that a city is less liable to severe strokes than the surrounding country, but, of course, this country area represents an area indefinitely larger than the city, and the comparison has no value unless we compare equal areas of the country and the city. It has been said that the western portion of the city of Washington (viz, Georgetown) is less subject to lightning than the rest of the city; but this "rest of the city" embraces an area that is more than ten times as large as Georgetown, and should, therefore, receive ten times as many strokes if they are evenly divided over the surface of the country.

Mr. W. M. Smith, voluntary observer at Van Wert, Ohio, states that there is a small region between South Avenue and Boyd Avenue, in that city, that is peculiarly subject to lightning strokes. An investigation of this and similar cases would doubtless prove instructive; but, as above stated, before undertaking to investigate the causes, we must first establish the fact very clearly and definitely by studying the frequency of strokes in equal areas of the surrounding region as carefully as we study the frequency in the electrical district itself.

The importance of considering the area and of determining the frequency per unit area is frequently lost sight of in statistical meteorology, and perhaps the most notable misapprehensions in this respect have been made with regard to the distribution of tornadoes, as shown in the following note.

TORNADO FREQUENCY PER UNIT AREA.

Several States of the Union have long been famous for tornadoes, and the popular dread of these destructive storms has been said to operate against the settlement of those States and against the peace of mind of the inhabitants. But the idea that tornadoes are very frequent has, to a large extent, resulted from a neglect to make proper allowance for the relative area of the respective States and of the tornado itself.

The chance of injury from a tornado evidently depends upon both the frequency of tornadoes per unit area and on the area covered by the path of the tornado, viz, the product of its length by its breadth. The area of destruction in any individual case will rarely amount to more than 25 square miles. Owing to the extremely local character of the destruction, our records of these storms become imperfect in proportion to the sparseness with which the country is settled, and in the newer States there is sometimes an apparent increase in the number of tornadoes, owing entirely to the increase in the inhabited area, and the consequent increased completeness of the record. In fact, our records for Kansas and Nebraska relate almost entirely to the eastern half of each State. In spite of the imperfection of our records the data contained in the following table has considerable value both to the meteorologist, the local inhabitant, and the insurance agent:

Tornado frequency.

States.	Area in units of 10,000 sq. miles.	Total number of tornadoes.			Annual average.	
		1874-1881. Finley.	1889-1896. Henry.	16 years.	Per State.	Per unit area.
Alabama	5.1	12	13	25	1.56	0.30
Alaska	51.7	0	0	0	0.00	0.00
Arizona	11.4	2	0	2	0.12	0.01
Arkansas	5.2	8	18	26	1.62	0.31
California	15.8	1	0	1	0.06	0.00
Colorado	10.4	1	1	2	0.12	0.01
Connecticut	0.5	2	0	2	0.12	0.24
Delaware	0.2	0	0	0	0.00	0.00
Dist. of Columbia	0.0	0	0	0	0.00	0.00
Florida	5.9	5	1	6	0.38	0.07
Georgia	5.8	29	12	41	2.56	0.44
Idaho	8.6	0	0	0	0.00	0.00
Illinois	5.5	50	29	79	4.94	0.90
Indiana	3.4	24	7	31	1.94	0.57
Ind Ter. and Okla	6.9	1	13	14	0.88	0.13
Iowa	5.5	26	28	54	3.38	0.61
Kansas	8.1	55	47	102	6.38	0.79
Kentucky	3.8	5	11	16	1.00	0.27
Louisiana	4.1	11	7	18	1.12	0.28
Maine	3.5	3	3	6	0.38	0.11
Maryland	1.1	8	3	11	0.69	0.63
Massachusetts	0.8	7	1	8	0.50	0.62
Michigan	5.6	13	5	18	1.12	0.20
Minnesota	8.4	21	22	43	2.69	0.32
Mississippi	4.7	9	15	24	1.50	0.32
Missouri	6.5	40	16	56	3.50	0.54
Montana	14.4	1	0	1	0.06	0.00
Nebraska	7.6	14	22	36	2.25	0.31
Nevada	11.2	1	0	1	0.06	0.00
New Hampshire	0.9	3	0	3	0.19	0.21
New Jersey	0.8	5	6	11	0.69	0.86
New Mexico	12.1	1	0	1	0.06	0.00
New York	4.7	20	5	25	1.56	0.33
North Carolina	5.1	14	2	16	1.00	0.20
North Dakota	7.1	4	2	6	0.38	0.05
Ohio	4.0	21	8	29	1.81	0.45
Oregon	9.5	0	0	0	0.00	0.00
Pennsylvania	4.6	17	13	30	1.88	0.41
Rhode Island	0.1	0	0	0	0.00	0.00
South Carolina	3.4	13	3	16	1.00	0.30
South Dakota	2.7	5	21	26	1.62	0.21
Tennessee	4.6	15	10	25	1.56	0.34
Texas	27.4	18	35	53	3.31	0.12
Utah	8.4	0	0	0	0.00	0.00
Vermont	1.0	2	0	2	0.12	0.12
Virginia	6.1	9	2	11	0.69	0.11
Washington	7.0	0	0	0	0.00	0.00
West Virginia	2.3	1	0	1	0.06	0.03
Wisconsin	5.3	11	10	21	1.31	0.25
Wyoming	9.8	1	0	1	0.06	0.01

The third column shows the number of tornadoes for each State for the eight years 1874–1881, as determined by Lieutenant Finley, and published in 1882. The fourth column contains the similar data for eight years, 1889–1896, as collected by Mr. A. J. Henry and published in the last annual volume of the Weather Bureau. To these items the Editor has added, in the second column, the area of the respective States, expressed in units of 10,000 square miles, or 100 miles square, as also finally the resulting averages showing the

number of tornadoes annually per State and per unit area. The table shows that even in the so-called tornado States, the probability that any area of 100 miles square will be visited by a tornado in any year, is generally less than certainty, or unity, or less than 100 per cent. If these large areas be divided up into 100 smaller ones of 100 square miles each, or 10 miles square, then the probability that *some one* of these will be visited by a tornado within a year is less than 1 per cent, but the probability that *any specific one* of these smaller areas will be so visited is only the hundredth part of 1 per cent per annum, or 1 per cent per century. Within such a smaller area of 10 miles square the destructive path of the tornado, when it finally comes, will probably cover less than 25 square miles, so that the probability that *some one* of the 100 areas of 1 square mile will be struck is less than one-fourth of 1 per cent per century; but for *any specific area* or farm of 1 square mile the probability is much less than one-sixteenth of 1 per cent per century. In fact, the probability that a given house will be destroyed by a tornado is less than the probability that it will be destroyed by lightning or fire.

THUNDERSTORMS AT EUSTIS, LAKE COUNTY, FLA.

The voluntary observer (Mr. H. W. O. Margary) at Eustis, Fla., sends a detailed record of the thunderstorms at his station during June. His location is about 28° 45′ N., 81° 40′ W; altitude 60 feet above Lake Eustis, which is supposed to be 120 feet above sea level; the range of his horizon is quite large, being most restricted on the south side by heavy timber, but to the eastward there is no known limit, as he has observed lightning belonging to storms far beyond the coast line, and, in one case, as far away as the Bahamas, 250 miles, on which occasion the lightning appeared like a small segment of a circle rising from 3° to 7° above the horizon. To the westward his horizon is level over the low swamps, lakes, and river valleys. The view in all directions is entirely uninterrupted for distances ranging between 2 and 7 miles.

With these ample surroundings the temptation to make a minute study of thunderstorms is very great; but, of course, elaborate work in this direction at only one isolated station loses a great deal of the value that would attach to it if similar records had been kept by other observers distant a few miles from the central station. Mr. Margary's record shows that thunder was heard on the 2d, 3d, 4th, 5th, 6th, 7th, 12th, 13th, 14th, 15th, 16th, 21st, 22d, and 24th, or, in all, fourteen days, on all which occasions it is presumed by him that the storm was within 3 or 4 miles of his station. Some details of these storms, especially the azimuths at which they appeared and ended, when compared with similar observations at neighboring stations, will eventually give the exact location and path of the center. Other data can be at once used to give us, for instance, the hours of the day at which thunderstorms occur most frequently, or the diurnal curve of frequency. Thus, during June, at or near Eustis, the prevalence of thunderstorms within each hour of the day seems to have been as follows:

Midnight to 1 a. m.	1	Noon to 1 p. m.	0
1 a. m. to 2 a. m.	0	1 p. m. to 2 p. m.	2
2 a. m. to 3 a. m.	1	2 p. m. to 3 p. m.	2
3 a. m. to 4 a. m.	2	3 p. m. to 4 p. m.	2
4 a. m. to 5 a. m.	1	4 p. m. to 5 p. m.	4
5 a. m. to 6 a. m.	2	5 p. m. to 6 p. m.	1
6 a. m. to 7 a. m.	0	6 p. m. to 7 p. m.	1
7 a. m. to 8 a. m.	2	7 p. m. to 8 p. m.	2
8 a. m. to 9 a. m.	2	8 p. m. to 9 p. m.	3
9 a. m. to 10 a. m.	0	9 p. m. to 10 p. m.	1
10 a. m. to 11 a. m	0	10 p. m. to 11 p. m.	1
11 a. m. to noon	0	11 p. m. to midnight	1

As no cyclonic storms visited Florida during this month, it is evident that the special frequencies between 3 a. m. and 9 a. m., between 1 p. m. and 5 p. m., and between 7 p. m. and 9 p. m. must all be determined by the alternation from warm sunshine at midday to cool radiation at night.

So far as we can make out from this record, which was apparently not prepared for the purpose of a study from this point of view, the thunderstorms appeared six times in the northwest, five in the north, two in the northeast, two east, three in the southeast, two in the south, three in the southwest, one in the west. The direction of motion of the storms in their paths is not easy to make out from the records at a single station, but, so far as can be gathered, the prevailing motion is from the southwest to the northeast. Mr. Margary especially notices a few storms that "came up with the wind," while the general rule was that they should "come up against the wind," and, as the wind is usually northeast, this would also indicate that the thunderstorms advanced from the southwest toward the northeast.

MECHANISM OF THUNDERSTORMS.

The advance of a storm against the wind may be interpreted as favorable to that view of the origin and structure of thunderstorms that has lately been so fully elaborated by E. Engelenburg in his memoir on the "Aerodynamic Theory of Thunderstorms," published in the XIXth volume (1896) of the Selections from the Archives of the Deutsche Seewarte. According to this view (which has been frequently expounded by the Editor since 1871) a thunderstorm is the result of the overturning of a considerable mass of the lower atmosphere, by which cool and especially dry air descends and runs under and pushes up warmer, moister air, which latter, after losing a small percentage of its moisture as rain, and a good deal of its heat by radiation from the clouds, becomes in its turn again the heavier, and descends beneath other moist air. This process of descent and ascent constitutes a vertical rotation around a horizontal axis, and will continue indefinitely until the rolling mass of air comes into regions where the topography of the ground or the presence of very dry air or very cold air near the ground as in the early morning hours, breaks up the thermodynamic process that is essential to the storm's automatic propagation. In the course of this rotation around a horizontal axis, it may occasionally happen that the rotation which is never strictly vertical, becomes considerably inclined, and the winds become so severe that the storm is spoken of as tornadic; but the true tornado with its funnel-shaped cloud is not to be considered as belonging to this class of thunderstorms. Beside the rolling thunderstorm, which advances broadside forward, there is another class of storms to which the tornado and the waterspout belong. In this class of storms the motive power is found in the buoyancy of a great cumulus cloud under whose center the lower air ascends because it is pushed upward into the region of abnormal low pressure within the cloud. Another class of thunderstorms includes those formed by air that is pushed upward by being blown against obstacles such as mountains, these often have no special internal maintaining power and may soon die away.

FREQUENCY OF THUNDERSTORMS.

We have received from Mr. H. H. Moore, voluntary observer at Windsor (five or ten miles north of Hartford, Conn.), a record of the number of days on which thunder has been audible; it embraces all days on which thunderstorms were heard by the observer without regard to the distance of the storm. Mr. Moore's record can be thrown into the following tabular form so as to give the average for each month of the year:

Months.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	Totals.	Annual mean.
January	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
February	0	0	0	0	1	1	0	1	1	0	0	0	0	0	4	0.29
March	1	1	0	1	0	0	1	2	1	0	1	0	0	0	8	0.57
April	2	1	0	2	1	3	3	2	4	0	2	2	3	3	28	2.00
May	3	3	0	5	5	5	2	4	2	3	3	5	2	8	50	3.57
June	7	3	4	3	4	8	6	6	3	10	5	7	10	2	78	5.57
July	9	8	5	8	10	4	3	2	4	11	8	10	7	9	98	7.00
August	4	5	9	2	12	3	3	6	6	8	5	5	7	9	84	6.00
September	2	6	0	4	2	2	1	5	2	2	2	3	4	4	39	2.79
October	0	0	1	0	1	2	2	1	0	1	0	0	0	0	8	0.57
November	0	0	0	2	0	0	0	0	0	0	0	0	1	0	3	0.22
December	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0.14
Annual	29	27	19	27	36	28	21	30	23	35	27	32	34	35	402	28.7

This table apparently gives us a close approximation to the normal distribution of thunderstorm days in that locality. It will be noticed that we have here not the number of storms, but the number of days on which one or more storms occurred. The record does not include thunderstorms at an indefinitely great distance, but only those that were near enough to give audible thunder, and this rarely occurs when the storm is more than 10 miles distant; in fact a distance of 3 miles would appear to be a fair average for the storms here recorded.

The months in which thunderstorm days were most numerous were: August, 1887, 12; July, 1892, 11; July, 1887, June, 1892, July, 1894, June, 1895, 10. The average number for July was 7, and the average number for the whole year, 29. The maximum was 36 in 1887.

AUDIBILITY OF THUNDER.

The audibility of thunder depends not merely on the initial intensity of the crash, but equally on the surroundings of the observer, since in the quiet country one will observe feeble sounds that escape the ear in a noisy city. But perhaps the most curious and important condition of audibility is that the thunder, or wave of sound, shall not be refracted or reflected by the layers of warm and cold air between the observer and the lightning or by the layers of wind, swift above and slow below, so as to entirely pass over or around the observer. Sound is somewhat analogous to a wave phenomenon, and consequently is subject to refraction when it passes obliquely through layers of air of different densities. Such refraction may occur at any time and place. Thus observers at the topmast of a ship frequently hear fog whistles that are inaudible at sea level; those on hilltops hear thunder that is inaudible in the valley; those in front of an obstacle hear sounds inaudible to those behind it. The rolling of thunder, like that of a distant cannonade, may be largely due to special reflections and refractions of sound. Again, the greater velocity of the air at considerable altitudes above the ground distorts the sound wave and shortens the limit of audibility to the leeward, but increases it to the windward. In this way it happens that the thunder from very distant storms rarely reaches the ear. Lightning may be seen and its illumination of clouds and mist may be recognized when it is even 200 miles distant, but thunder is rarely audible 10 miles. Hence we see the need of a large number of stations if we would catch the record of every thunderstorm that happens. Probably one for every 25 square miles would not be too many. On the other hand, a few stations would suffice, at least for the nighttime, if each should report the direction and movement of every case of distant lightning.

MOVEMENTS OF WINDS AND CLOUDS IN MINNESOTA.

Mr. O. F. Rice, of Pine Island, Minn., inquires "why storm clouds appear so often on our west and winds come so constantly from the southern directions?"

As this very general question was penned in July, the Editor thinks it likely that Mr. Rice had in mind the southerly winds of the summer season in Minnesota, for the question can hardly refer to the average winds of the whole year, since in the winter time these come from the north or northwest. If one studies carefully the charts of resultant winds published regularly on Chart No. IV of the MONTHLY WEATHER REVIEW, he will perceive that in passing from the summer to the winter and *vice versa*, a gradual change takes place, not only in the direction of the winds, but also in the distribution of the temperature and barometric pressure of the lower atmosphere. These observations although made at the surface of the earth give us reason to believe that the average temperature of the mass of air above Minnesota, Manitoba, and the neighboring region is in summer much warmer than over the country to the westward of the Rocky Mountains. It will also be noticed that the barometric pressure in this central portion of the continent is, in the summer time, lower than on the Pacific Coast to the westward, and especially lower than on the Atlantic Coast to the south and east. The winds move in obedience to the differences of pressure prevailing in the neighborhood of the station. These differences may be due either to differences of temperature—by reason of which cold, dense air underflows and raises up warmer, light air—or they may be due to the differences of pressure at any level by reason of which regions of great pressure push their air into the regions of low pressure. Both of these causes are usually active in the free atmosphere, and doubtless the southerly winds of Minnesota represent the resultant effect of the general distribution of pressure and temperature in North America—not only at the surface of the ground but in the free air above the ground.

If we ascend through the lower atmosphere and study the motions of the upper air as shown by the clouds, we find a general rapid movement from west to east or southwest to northeast, showing that the motions of the upper air are largely controlled by the pressures and temperatures prevailing at the upper level. In general, a certain definite mass of air tends to flow down a gentle slope toward the region where the density of the air is less than its own at the same height above sea level. As soon as the motion begins the influence of the rapid diurnal whirl of the earth on its axis is felt by the moving air so that the upper layers above Minnesota move nearly from west to east while the lowest layer at the surface moves from the south or southwest to northeast. Therefore, while the upper clouds and the storms that they attend come from the west the lowest winds are blowing from the south.

In the winter time the distribution of temperature and pressure over North America is such as to force the cold air of Canada southward over Minnesota. The upper layers move more nearly from the west, while the lowest layers come more nearly from the north, so that at the surface of the earth northerly winds are more frequent; consequently, in the winter we do not have southerly winds below and westerly winds above, except on those dates when low pressure prevails in Canada analogous to the low pressures of the summer season.

HOURLY RESULTS FROM SELF-REGISTERS.

The Weather Bureau maintains self-registers for pressure, temperature, wind direction, rainfall, and sunshine at a very large proportion of its stations, and for the wind velocity at all of them, and the general results are given monthly in the elaborate climatological tables contributed by Mr. A. J. Henry, Chief of the Records Division. In continuation of this work Mr. Henry has prepared, for the forthcoming Annual Report

of the Chief of the Weather Bureau for the year 1896, extended tables of the hourly, monthly, and seasonal mean values, the resultant winds, and other climatological data for a selected group of about 28 stations; as an abstract of this more elaborate work the Editor has, with his permission, compiled the accompanying tables on pages 254–256.

Tables 1, 2, and 3 give, respectively, the mean pressure, temperature, and velocity of the wind for each hour of the day for the five years 1891–95, inclusive. The figures in Table 1 were deduced from the records of the Richard aneroid barographs. These registers are checked by at least two comparative readings daily of the mercurial barometers at the respective stations. They are, therefore, at least approximately corrected for the diurnal and for the non-periodic fluctuations in the temperature of the aneroid. These fluctuations of instrumental temperature, as is well known, affect the records of the aneroid quite appreciably, but it is not likely that an outstanding error of 0.01 inch has been thereby introduced into these 5-year means. The pressures thus given, as measured in inches of the mercurial barometer, are the so-called "apparent pressures," and, in order to obtain standard pressures, according to the accepted common sense rule of physicists and meteorologists, they still need a correction for the local value of gravity, or the so-called reduction to standard gravity. These corrections are given in the last column of Table 1; they have been determined by using the values of local gravity, given in Table 7, which were computed by the use of Helmert's formula. (See MONTHLY WEATHER REVIEW, 1896, p. 463.) According to Mr. G. R. Putnam, of the Coast and Geodetic Survey, this formula represents the force of gravity at any locality and altitude in the United States to within 0.0002 of its value. Helmert's formula represents the force of gravity at a given elevation above the sea without regarding any possible local peculiarities of topography. Owing to these latter the values of the computed gravity may be in error by three units in the first decimal or 0.0003 of the full value of gravity in an extreme case, and it is therefore desirable to use the observed forces of gravity at each station instead of these computed approximations. Although our mean apparent atmospheric pressures are given to the nearest thousandth of an inch, yet the resulting standard pressures can only be considered reliable to the nearest hundredth of an inch on account of the outstanding uncertainty in our knowledge of the local force of gravity. The reduction to standard gravity in Table 4 differs but little from the reduction for 30 inches of mercury at sea level.

Whenever changes in the location of the station, affecting barometric pressures, have been made during these five years, the records have all been reduced uniformly to the elevation of the barometer above mean sea level that obtained on December 31, 1895, and these elevations are those given in Table 7.

The temperatures recorded by the Richard thermographs have been reduced to standard temperatures within the instrument shelter in which the thermograph is placed by two or more daily readings of the standard whirled thermometer. These standard thermometers rarely have errors exceeding 0.3° F. at any part of their scales, and as the positive and negative corrections are eliminated in the mean of the 150 readings on which each of these printed numbers depends, the temperatures may be considered as standard for the interiors of the shelters and for the respective altitudes above ground. As the shelters are single "jalousies," allowing the wind free entrance, it is believed that only in exceptional cases, such as absolute calm in sunshine, can the temperature of the thermometer differ from that of the outside free air by more than 0.5° F.

The altitudes of the thermometers above ground are given for December 31, 1895, in Table 7. In a number of cases the altitudes at that date are considerably higher than in the previous years, and especially is this the case in large cities where the growing tendency to erect tall buildings has necessitated the removal of the local Weather Bureau station to the top of the tallest building, in order that our signal flags may be placed most advantageously. For the same reason, therefore, there has been a steady upward movement of anemometers and rain-gauges. But, as these tall buildings are also large, the influence of the building itself becomes quite appreciable, and one should consider the height of the instruments above the roof in connection with the height above ground; it is not practicable at present to answer the complex question as to what may be the exact nature and amount of the reduction of a temperature, wind velocity, or rainfall from these elevated stations down to the standard exposure near the surface of the open ground. Undoubtedly on our elevated buildings the temperatures are slightly lower, the rain-catch considerably smaller and the wind velocity frequently larger than for stations at the surface of the ground, but comparison with other stations shows that the differences do not seem to be so large as has often been feared. So far as temperature is concerned it is much more difficult to determine the true temperature of the air near the ground than at the top of a tall building, because at the ground the wind is much diminished and is liable to bring special streaks of hot or cold air, therefore the observer must whirl his thermometers more rapidly and for a longer period in order to get the average temperature; at the higher level, the special streaks of hot and cold air have all merged into one homogeneous mass, and the strength of the wind facilitates the ventilation of the thermometer shelter, and therefore the rapidity with which the thermometer bulb follows the temperature of the air. From this latter point of view the internal sensitiveness of the thermometer is a matter of prime importance; the coefficient of sensitiveness (see Treatise on Meteorological Apparatus p. 71) is quite small in Weather Bureau thermometers, so that if the bulb is 5° above the temperature of the air it will fall to that temperature in less than two minutes, under steady ventilation. Undoubtedly the maximum temperatures in an elevated shelter will be lower and the minimum temperatures higher than those in a ground shelter; it is this difference that makes the ground shelter so especially local in its character. It is often said that for biological studies a climatologist needs temperatures nearer the surface of the ground than are given by the elevated shelters of the Weather Bureau, but the case ought to be put more strongly than this, since in biology and in hygiene one should have the temperatures at the spot where the plant or the man is, and, therefore, special observations must be made by these students in the localities that interest them. In a general way, the average temperature at any small altitude above the earth surface may be reduced to that at a standard elevation of 5 feet above the surface, provided the wind is blowing strongly at both places, by adopting the adiabatic law of cooling, viz, 1° C., per 100 meters, or 1° F. per 182.3 feet. When the wind is not blowing, as in the early morning hours, and when the lower station is in a special layer of cold air, this rule is entirely changed, and radiation and conduction become the important factors. Therefore, a reduction to standard altitude above ground can only be rationally applied to the average of the whole twenty-four hours, or of the year, and this reduction, calculated for the rate just given, will be found in the last column but one of Table 3.

The reduction of temperatures to sea level, like the reduction of pressure to sea level, is a process encumbered with several hypotheses, and the Editor considers it wiser to reduce such observations as are made at continental stations to some upper level representing the real atmosphere, in whose phe-

TABLE 1.—*Mean local pressure at each hour of seventy-fifth meridian time.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Daily mean.	Reduction to standard gravity.
Bismarck, N. Dak	28.187	.186	.186	.186	.186	.188	.192	.195	.199	.200	.199	.197	.187	.176	.165	.159	.158	.158	.161	.165	.172	.179	.184	.186	28.181	+0.000
Boston, Mass	29.885	.884	.882	.882	.888	.894	.902	.907	.906	.903	.894	.881	.869	.862	.859	.860	.865	.871	.879	.884	.890	.891	.890	.888	29.884	−0.008
Buffalo, N. Y	29.266	.263	.262	.261	.265	.271	.280	.286	.290	.291	.288	.279	.268	.259	.254	.252	.253	.256	.261	.266	.270	.272	.271	.270	29.269	−0.008
Chicago, Ill	29.139	.137	.137	.136	.137	.142	.148	.156	.160	.162	.163	.158	.146	.134	.126	.122	.121	.122	.126	.130	.136	.141	.142	.142	24.140	−0.010
Cincinnati, Ohio	29.393	.391	.391	.392	.395	.404	.413	.420	.426	.427	.425	.415	.398*	.383	.372	.366	.365	.367	.373	.378	.387	.392	.394	.395	29.394	−0.017
Cleveland, Ohio	29.236	.236	.237	.239	.244	.251	.259	.265	.269	.269	.267	.258	.245	.233	.226	.222	.222	.224	.229	.233	.235	.237	.237	.237	29.242	−0.012
Detroit, Mich	29.244	.242	.242	.242	.244	.249	.257	.263	.267	.268	.266	.258	.245	.234	.227	.224	.224	.226	.231	.237	.243	.246	.246	.246	29.245	−0.010
Dodge City, Kans	27.405	.402	.399	.397	.396	.397	.408	.411	.421	.428	.432	.432	.421	.403	.385	.373	.366	.362	.364	.370	.380	.391	.400	.404	27.398	−0.024
Eastport, Me	29.882	.880	.879	.880	.885	.892	.900	.906	.910	.908	.899	.888	.878	.872	.869	.868	.870	.874	.878	.882	.886	.886	.886	.884	29.885	−0.000
Galveston, Tex	30.036	.032	.027	.025	.025	.030	.040	.051	.063	.072	.077	.074	.060	.042	.027	.015	.009	.007	.009	.016	.024	.034	.039	.039	30.036	−0.042
Havre, Mont	27.329	.329	.329	.327	.327	.326	.3.7	.329	.334	.340	.344	.346	.342	.332	.321	.311	.305	.302	.300	.299	.305	.313	.321	.326	27.324	+0.008
Key West, Fla	30.056	.046	.037	.034	.036	.044	.058	.070	.080	.085	.084	.074	.058	.042	.029	.019	.019	.025	.035	.051	.060	.066	.067	.063	30.052	−0.051
Marquette, Mich	29.158	.157	.157	.156	.157	.159	.165	.169	.170	.172	.173	.171	.163	.156	.151	.151	.153	.154	.156	.158	.161	.162	.162	.161	29.160	+0.002
Memphis, Tenn	29.660	.658	.657	.658	.660	.668	.679	.690	.700	.706	.709	.703	.686	.667	.651	.641	.636	.634	.638	.643	.652	.659	.662	.662	29.666	−0.028
New Orleans, La	30.024	.019	.015	.014	.017	.025	.036	.045	.056	.062	.062	.055	.038	.020	.005	.996*	.992	.993	.999	.006†	.017	.026	.029	.027	30.024	−0.040
New York, N. Y	29.721	.719	.716	.714	.717	.724	.732	.738	.740	.739	.732	.721	.708	.698	.692	.691	.693	.698	.704	.712	.719	.723	.725	.724	29.717	−0.013
Philadelphia, Pa	29.936	.934	.933	.933	.937	.944	.954	.962	.965	.965	.958	.944	.929	.918	.911	.908	.910	.915	.923	.931	.938	.941	.941	.940	29.936	−0.014
Pittsburg, Pa	29.158	.157	.157	.158	.161	.168	.175	.181	.183	.181	.176	.165	.151	.138	.130	.127	.128	.132	.139	.147	.152	.155	.157	.158	29.156	−0.015
Portland, Oreg	29.892	.894	.896	.896	.897	.898	.897	.897	.900	.904	.908	.912	.914	.912	.902	.892	.882	.875	.869	.865	.867	.872	.879	.887	29.892	+0.001
St. Louis, Mo	29.444	.442	.442	.442	.444	.450	.459	.468	.474	.478	.479	.474	.459	.443	.429	.421	.417	.417	.420	.425	.433	.440	.444	.445	29.444	−0.018
St. Paul, Minn	29.094	.093	.093	.094	.095	.098	.103	.108	.111	.113	.113	.110	.099	.087	.076	.071	.071	.068	.070	.074	.080	.087	.091	.093	29.091	−0.002
Salt Lake City, Utah	25.662	.664	.663	.663	.664	.664	.667	.672	.679	.686	.691	.695	.692	.683	.669	.657	.649	.643	.639	.639	.642	.648	.654	.660	25.664	−0.018
San Diego, Cal	29.949	.948	.944	.939	.933	.938	.927	.929	.938	.949	.958	.964	.966	.960	.947	.934	.925	.920	.917	.917	.923	.931	.940	.946	29.939	−0.033
San Francisco, Cal	29.901	.902	.901	.899	.896	.893	.891	.893	.900	.909	.918	.925	.930	.928	.917	.905	.894	.886	.880	.875	.877	.881	.880	.897	29.899	−0.030
Santa Fe, N. Mex	23.295	.296	.295	.294	.292	.291	.292	.297	.303	.309	.314	.318	.315	.304	.289	.278	.268	.263	.261	.263	.268	.277	.286	.293	23.290	−0.035
Savannah, Ga	29.994	.990	.987	.987	.992	.002	.014	.024	.031	.034	.029	.015	.995	.978	.966	.961	.962	.968	.977	.987	.995	.000	.001	.998	29.995	−0.035
Washington, D. C	29.956	.953	.952	.952	.956	.964	.973	.981	.986	.989	.985	.971	.956	.941	.933	.928	.929	.934	.941	.949	.957	.960	.960	.959	29.957	−0.016

*29.996. †30.006.

TABLE 2.—*Mean local temperature at each hour of seventy-fifth meridian time.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Daily mean.	Reduction from shelter to ground.	Reduction from ground to sea level.
Bismarck	36.4	35.5	34.8	34.0	33.2	32.6	32.2	33.0	34.4	37.0	40.0	42.7	45.0	46.8	48.1	48.9	49.0	48.3	46.7	44.7	42.3	40.2	38.7	37.4	40.1	0.09	3.34
Boston	46.3	45.9	45.5	45.1	44.8	44.9	45.8	47.4	48.9	50.4	51.8	53.0	53.7	54.1	54.0	53.5	52.9	52.0	50.7	49.7	48.8	48.1	47.4	46.9	49.2	0.63	0.03
Buffalo	45.7	45.3	45.0	44.6	44.3	44.4	44.8	45.9	46.9	48.0	49.1	50.0	50.6	51.0	51.3	51.2	50.8	50.0	49.2	48.3	47.6	47.1	46.5	46.2	47.7	0.57	1.21
Chicago	46.5	46.0	45.5	45.0	44.6	44.2	44.2	44.9	45.9	47.1	48.1	49.1	49.8	50.4	50.8	51.1	51.1	50.7	50.0	49.3	48.6	48.1	47.5	47.0	47.7	1.32	1.19
Cincinnati	52.0	51.3	50.5	49.9	49.2	48.6	48.6	49.4	51.1	53.1	55.1	56.9	58.3	59.2	60.0	60.4	60.4	59.9	58.9	57.6	56.3	55.1	54.0	52.9	54.5	0.84	1.11
Cleveland	47.0	46.5	46.0	45.6	45.2	44.9	45.2	46.8	48.2	49.8	51.0	52.0	52.6	53.0	53.2	53.3	53.2	52.8	52.0	51.0	50.1	49.2	48.4	47.7	49.4	0.67	1.30
Detroit	45.1	44.7	44.3	43.8	43.4	43.1	43.4	44.7	46.2	48.0	49.7	51.0	52.1	52.9	53.4	53.4	52.9	52.1	50.8	49.4	48.3	47.4	46.6	45.9	48.0	0.87	1.20
Dodge City	48.0	47.2	46.3	45.5	44.7	44.0	43.3	44.2	46.2	49.6	53.7	56.9	59.9	61.9	63.4	64.2	64.3	63.4	61.1	57.3	54.4	52.3	50.6	49.2	53.0	0.24	4.97
Eastport	39.4	39.0	38.7	38.4	38.3	38.7	39.5	40.7	42.0	43.2	44.3	45.1	45.7	46.0	45.9	45.5	44.7	43.7	42.7	42.0	41.4	40.8	40.3	39.8	41.9	0.38	0.08
Galveston	68.4	68.2	67.9	67.6	67.4	67.1	66.9	67.2	67.7	68.5	69.4	70.2	70.8	71.2	71.5	71.5	71.4	71.0	70.4	69.8	69.5	69.2	68.9	68.7	69.2	0.47	0.01
Havre	37.4	36.5	35.7	34.9	34.1	33.4	32.9	33.3	34.7	36.8	39.7	42.6	45.1	47.2	48.8	49.9	50.6	50.2	49.0	47.3	44.8	42.2	40.2	38.7	41.1	0.08	4.95
Kansas City	51.2	50.4	49.6	48.9	48.2	47.6	47.2	47.4	48.4	50.3	52.7	54.9	56.6	58.1	59.2	59.9	60.1	59.7	58.5	56.8	55.5	54.3	53.1	52.1	53.4	0.43	1.79
Key West	74.8	74.6	74.4	74.2	74.1	74.1	74.6	75.8	76.7	77.6	78.4	78.8	78.9	79.1	78.9	78.6	77.6	77.2	76.2	75.9	75.6	75.4	75.2	74.9	76.3	0.23	0.04
Marquette	38.8	38.5	38.2	37.8	37.4	37.3	37.6	38.5	39.5	40.7	42.0	43.0	47.1	44.2	44.3	44.2	43.8	43.0	42.2	41.2	40.3	39.7	39.4	39.0	40.6	0.37	1.28
Memphis	58.0	57.3	56.6	56.0	55.4	54.8	54.7	54.8	57.1	59.2	61.3	63.4	64.8	66.1	66.9	67.3	67.1	66.3	65.0	63.4	62.0	60.8	59.8	58.9	60.8	0.77	1.34
New Orleans	65.4	65.0	64.6	64.2	63.9	63.6	63.6	64.3	65.5	67.3	69.1	70.6	71.6	72.3	72.7	72.9	72.7	72.0	70.7	69.2	68.1	67.3	66.5	65.9	67.0	0.62	0.02
New York	49.6	49.1	48.6	48.2	47.9	47.7	48.1	49.1	50.4	51.9	53.5	54.8	55.9	56.5	56.8	56.7	56.0	55.2	54.1	53.1	52.3	51.6	50.8	50.2	52.0	1.64	0.14
Philadelphia	50.3	49.8	49.4	49.0	48.6	48.5	49.0	50.4	51.8	53.6	55.3	56.8	57.9	57.9	59.0	59.0	58.3	57.2	55.7	54.5	53.3	52.4	51.6	51.0	53.4	0.92	0.08
Pittsburg	50.1	49.4	48.7	48.1	47.7	47.4	47.8	49.1	50.9	53.0	55.0	56.6	57.8	58.5	58.9	59.0	58.5	57.6	56.4	55.2	53.9	52.8	51.8	51.0	53.1	0.64	1.51
Portland, Oreg	51.1	50.2	49.2	48.5	47.8	47.2	46.6	46.3	46.3	46.8	47.8	49.2	51.0	52.7	54.3	55.8	56.9	57.5	57.6	57.2	56.1	54.9	53.4	52.2	51.5	1.12	0.09
St. Louis	53.4	52.6	51.9	51.2	50.6	50.1	49.9	50.5	51.7	53.6	55.7	57.7	59.2	60.5	61.4	61.8	61.7	61.0	59.9	58.6	57.4	56.2	55.2	54.3	55.7	0.60	0.94
St. Paul	41.4	40.6	39.8	39.1	38.4	37.8	37.5	38.2	39.3	41.2	43.5	45.6	47.4	48.7	49.7	50.2	50.4	49.9	48.9	47.5	46.0	44.7	43.5	42.5	43.8	0.63	1.52
Salt Lake City	48.5	47.8	47.0	46.3	45.8	45.2	44.7	44.7	45.1	47.0	49.8	52.5	54.7	56.3	57.2	57.9	58.1	58.0	57.2	55.8	54.1	52.0	50.6	49.4	51.1	0.46	8.56
San Diego	58.0	57.6	57.1	56.8	56.5	56.3	56.0	55.8	55.9	56.8	59.2	61.3	63.4	64.6	65.2	65.4	65.4	65.1	64.2	63.2	61.5	60.3	59.3	58.7	60.1	0.32	0.07
San Francisco	53.1	52.8	52.5	52.2	51.9	51.6	51.3	51.1	51.1	51.7	52.9	54.4	55.9	57.3	58.3	58.9	59.1	58.8	58.0	56.8	55.7	54.8	54.1	53.6	54.5	0.89	0.05
Savannah	62.0	61.4	60.9	60.5	60.0	59.7	60.2	61.9	64.5	67.1	69.4	71.1	72.1	72.6	72.4	71.5	70.1	68.3	66.5	65.2	64.3	63.7	63.1	62.5	65.5	0.35	0.11
Washington	50.5	50.0	49.4	48.9	48.4	48.3	49.0	51.0	53.1	55.3	57.2	58.9	60.1	61.0	61.4	61.3	60.4	59.0	57.1	55.3	53.9	53.0	52.0	51.2	54.4	0.32	0.16

nomena we are vitally interested. But as a simple manner of presenting statistics, and not as a method of studying any real atmospheric phenomenon, there can be no objection to the use of isotherms of temperature reduced to sea level, for which purpose a rate of increase or diminution, varying with the month of the year and the hour of the day, must be used, the average for the whole year being 2.0° F. per 1,000 feet from the standard ground to sea level. This reduction of annual means to sea level is given in the last column of Table 3. The sum of these last two columns gives the total reduction to sea level for mean annual temperatures.

When such reduced temperatures are plotted and isotherms drawn, the latter should be considered as simply a convenience by means of which one can ascertain the approximate temperature at the surface of the ground for any region where actual observations have not been made, to do which one interpolates from the map the isotherms for sea-level temperature and then applies a reduction of 2° of cooling per thousand feet of ascent.

Tables 3 and 6 give the hourly and monthly mean velocity of the wind. In the first of these tables, for instance, the figures 8.5 for Bismarck, indicate the average movement of the wind 8.5 miles during the hour from midnight to 1 o'clock, or, in general, during the hour ending with the moment of standard time inscribed at the head of the table. In this respect this table differs from Nos. 1 and 2, which give the pressure and temperature, respectively, at the exact moments of standard time inscribed at the head of the table.

As the anemometers, like the thermometers, are placed as high as possible above ground their records need a reduction to some standard elevation before they can become strictly comparable. But such a reduction will vary according to the nature of the surface beneath the anemometer, and even with the time of day and the season of the year. On the average of the year we may expect that the higher anemometers will show the greater velocities. The heights of the anemometers above ground are shown in the seventh column of Table 7, but, as most of these are located in cities, the

TABLE 3.—*Mean local wind velocity for each hour interval of seventy-fifth meridian time.*

Stations.	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	Noon.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.	Midnight.	Daily mean.	Reduced to 30 feet.
Bismarck	8.5	8.4	8.2	8.1	8.2	8.2	8.0	8.2	8.7	9.5	10.7	10.8	12.9	13.7	14.0	14.0	13.7	13.1	11.9	10.8	9.7	9.2	8.9	8.8	10.3	11.3
Boston	10.6	10.3	10.2	10.1	10.1	10.2	10.4	10.7	11.4	12.0	12.5	13.0	13.3	13.4	13.5	13.3	12.7	12.1	11.5	11.1	11.2	11.0	10.8	10.8	11.5	6.3
Buffalo	10.4	10.2	10.2	10.2	10.2	10.2	10.5	10.6	11.2	11.8	12.3	12.8	13.2	13.3	13.4	13.1	12.6	12.3	11.7	11.0	10.6	10.5	10.4	10.4	11.4	8.0
Chicago	17.1	16.8	16.9	16.9	16.9	16.9	17.0	16.5	16.6	16.9	17.2	17.6	18.2	18.1	18.6	18.6	18.4	17.9	17.4	16.7	16.7	16.8	16.9	17.0	17.3	8.0
Cincinnati	5.7	5.6	5.4	5.4	5.4	5.4	5.5	6.0	7.0	7.7	8.4	8.8	9.3	9.4	9.4	9.4	9.1	8.7	7.8	6.9	6.5	6.2	6.0	5.9	7.1	4.1
Cleveland	11.4	11.5	11.4	11.4	11.4	11.3	11.3	11.4	11.8	12.3	12.9	13.2	13.6	13.7	13.6	13.2	12.5	11.6	10.7	10.4	10.6	11.0	11.2	11.3	11.9	7.1
Detroit	9.7	9.5	9.5	9.4	9.4	9.7	9.6	9.8	10.3	11.2	11.8	12.7	13.0	13.2	13.4	13.2	12.6	12.1	10.8	10.2	10.0	9.9	9.9	10.0	10.9	6.2
Dodge City	10.6	10.4	10.3	10.2	9.9	9.7	9.5	9.5	10.5	12.1	13.6	14.3	14.5	14.8	15.1	15.1	14.9	14.5	13.5	12.1	10.9	10.8	10.8	10.8	12.0	10.8
Eastport	9.4	9.2	9.2	9.3	9.3	9.6	9.6	10.0	10.5	11.0	11.3	11.7	11.6	11.8	11.7	11.4	10.9	10.5	9.9	9.8	9.8	9.7	9.5	9.7	10.3	8.2
Galveston	11.1	11.0	11.0	10.7	10.6	10.5	10.4	10.4	10.9	11.3	11.6	11.7	12.0	11.9	12.0	12.0	11.9	11.7	11.2	10.9	10.9	11.0	11.0	11.0	11.2	7.8
Havre	8.3	8.3	8.2	8.3	8.4	8.5	8.4	8.4	8.7	9.4	10.3	11.0	11.9	12.3	12.7	12.8	12.6	11.9	11.1	10.4	9.5	8.7	8.5	8.4	9.9	10.1
Kansas City	7.9	7.7	7.6	7.7	7.6	7.5	7.7	7.8	8.4	9.0	9.7	10.0	10.6	10.4	10.6	10.6	10.4	9.8	9.0	8.1	7.8	7.9	8.0	7.9	8.8	6.2
Key West	9.2	9.3	9.1	8.9	8.9	8.8	8.8	9.4	10.0	10.4	10.7	10.8	10.8	10.9	10.8	10.5	10.4	9.9	9.6	9.6	9.7	9.6	9.6	9.4	9.8	8.8
Marquette	9.9	10.0	10.0	9.9	9.9	9.7	9.6	9.8	10.3	10.8	11.2	11.5	11.7	11.8	11.6	11.2	10.6	9.8	9.0	8.6	8.6	9.0	9.5	9.8	10.2	7.1
Memphis	6.8	6.6	6.6	6.5	6.5	6.4	6.5	6.6	7.2	7.8	8.1	8.3	8.7	8.5	8.7	8.7	8.5	8.1	7.4	6.5	6.4	6.5	6.6	6.8	7.3	4.1
New Orleans	7.4	7.3	7.2	7.1	7.0	7.0	7.1	7.3	8.3	9.3	9.8	10.1	10.6	10.6	10.7	10.7	10.3	9.7	8.8	8.0	7.8	7.7	7.6	7.6	8.5	5.1
New York	10.4	10.1	10.0	9.9	10.0	10.1	10.1	10.4	11.0	11.4	11.8	12.1	12.4	12.6	12.9	12.9	12.8	12.3	11.7	11.3	11.2	12.0	10.8	10.6	11.2	4.9
Philadelphia	9.2	9.0	9.0	9.0	9.0	9.0	9.3	10.0	10.7	11.3	11.7	11.9	12.3	12.5	12.5	12.4	12.0	11.3	10.6	10.1	10.0	9.7	9.5	9.3	10.5	5.8
Pittsburg	5.4	5.2	5.1	5.1	5.1	5.1	5.3	5.7	6.3	7.0	7.6	7.8	8.3	8.3	8.4	8.3	8.0	7.5	6.8	6.3	6.0	5.8	5.7	5.5	6.5	3.9
Portland, Oreg.	7.5	7.2	7.0	6.6	6.5	6.4	6.3	6.3	6.2	6.4	6.9	7.4	8.0	8.1	8.3	8.6	8.7	8.8	8.8	8.6	8.3	8.0	7.7	7.6	7.5	3.8
St. Louis	10.5	10.2	10.2	10.0	9.9	9.9	9.8	10.0	10.6	11.2	11.6	12.0	12.4	12.6	12.9	13.0	13.0	12.6	11.8	11.0	10.8	10.7	10.7	10.7	11.2	5.6
St. Paul	6.5	6.2	6.1	6.1	6.1	6.2	6.3	6.3	6.8	7.6	8.4	9.2	9.7	9.7	9.9	9.9	9.6	9.2	8.4	7.5	6.9	6.7	6.6	6.6	7.6	4.6
Salt Lake City	4.6	4.6	4.5	4.4	4.3	4.4	4.3	4.3	4.2	4.2	4.6	5.6	6.9	7.9	8.8	9.1	9.2	8.9	7.9	6.8	5.7	5.0	5.0	4.9	5.8	4.1
San Diego	3.1	3.0	3.0	3.0	3.1	3.2	3.1	3.2	3.2	3.2	3.4	3.9	5.4	6.8	8.0	8.8	9.0	8.9	8.3	7.2	5.9	4.6	3.8	3.4	5.0	4.0
San Francisco	9.1	8.3	7.8	7.4	7.1	6.8	6.6	6.6	6.5	6.5	6.9	7.5	8.3	9.3	11.0	12.7	14.3	15.5	15.7	15.6	14.9	13.4	11.8	10.3	10.0	5.7
Santa Fe	6.3	6.2	5.8	5.5	5.3	5.1	5.0	5.0	5.6	6.8	7.9	8.8	9.6	10.1	10.4	10.3	10.1	9.4	8.3	7.2	6.6	6.6	6.7	7.2	6.5
Savannah	6.6	6.3	6.4	6.4	6.4	6.5	6.6	6.9	7.6	8.2	8.8	9.2	9.6	10.0	10.3	10.5	10.2	9.5	8.2	7.3	7.1	6.9	6.8	6.9	7.9	6.3
Washington	5.1	5.0	4.9	4.9	4.9	4.9	5.1	5.8	6.8	7.9	8.6	9.0	9.5	9.6	9.6	9.3	8.6	7.5	6.6	5.8	5.6	5.4	5.3	5.2	6.7	5.4

TABLE 4.—*Average pressure.*

Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Bismarck	.214	.239	.197	.156	.175	.121	.203	.195	.137	.186	.193	.159	28.181
Boston	.873	.901	.869	.872	.839	.856	.842	.848	.951	.874	.953	.931	29.884
Buffalo	.235	.290	.274	.266	.219	.247	.260	.252	.325	.264	.295	.302	29.269
Chicago	.133	.178	.131	.103	.098	.105	.153	.135	.174	.148	.166	.158	29.140
Cincinnati	.407	.444	.396	.349	.333	.340	.379	.345	.423	.414	.450	.462	29.394
Cleveland	.221	.272	.242	.224	.190	.212	.241	.221	.287	.243	.269	.282	29.242
Detroit	.219	.273	.247	.229	.195	.217	.246	.230	.292	.248	.268	.273	29.245
Dodge City	.418	.437	.356	.314	.345	.348	.424	.425	.406	.444	.440	.423	27.398
Eastport	.875	.879	.852	.874	.869	.881	.845	.863	.949	.870	.954	.909	29.885
Galveston*	.092	.096	.047	.078	.950	.979	.030	.982	.988	.035	.118	.142	30.036
Havre	.345	.353	.301	.296	.313	.289	.353	.358	.301	.357	.328	.288	27.324
Key West	.110	.120	.090	.062	.009	.018	.078	.015	.976	.949	.071	.124	30.052
Marquette	.130	.215	.172	.192	.126	.138	.168	.181	.155	.122	.172	.154	29.160
Memphis	.719	.732	.664	.608	.600	.590	.635	.602	.660	.695	.736	.750	29.666
New Orleans	.082	.075	.035	.996	.968	.954	.009	.958	.969	.017	.101	.124	30.024
New York	.711	.752	.712	.702	.655	.679	.675	.666	.773	.707	.784	.783	29.717
Philadelphia	.940	.979	.935	.920	.869	.887	.889	.875	.986	.930	.008	.016	29.936
Pittsburg	.134*	.176	.144	.131	.100	.125	.147	.124	.206	.164	.202	.213	29.156
Portland, Oreg.	.935	.897	.849	.898	.863	.891	.893	.852	.843	.904	.953	.927	29.892
St. Louis	.485	.515	.432	.374	.377	.375	.432	.408	.444	.478	.503	.500	29.444
St. Paul	.136	.161	.104	.049	.050	.038	.102	.094	.071	.073	.124	.091	29.091
Salt Lake City	.720	.662	.598	.621	.594	.604	.663	.666	.643	.724	.745	.733	25.664
San Diego	.008	.002	.972	.969	.909	.867	.878	.859	.854	.913	.985	.048	29.939
San Francisco	.972	.948	.917	.957	.849	.836	.826	.803	.823	.889	.958	.015	29.899
Santa Fe	.217	.193	.177	.220	.261	.310	.415	.411	.377	.353	.299	.250	23.290
Savannah	.035	.052	.000	.985	.934	.945	.979	.923	.972	.964	.063	.091	29.995
Washington, D.C.	.966	.006	.958	.936	.883	.901	.911	.892	.999	.956	.032	.042	29.957

*Means for four years.

TABLE 5.—*Average temperature.*

Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Bismarck	9.6	7.2	23.7*	42.0*	52.9	63.2	69.5	68.6	59.7	44.3	24.4	15.8	40.1
Boston	28.0	27.9	35.3	46.3	56.3	66.4	70.6	69.2	63.5	52.2	41.6	33.7	49.2
Buffalo	25.0	24.5	31.9	43.6	54.0	67.1	69.4	69.1	64.3	51.8	38.8*	32.4	47.7
Chicago	21.9	24.4	33.6	45.7	54.7	67.6	71.1	70.8	66.5	51.6	35.4	29.6	47.7
Cincinnati	29.8	33.9	41.7	54.8	62.2	74.7	76.0	75.5	70.6	55.5	42.2	37.4	54.5
Cleveland	25.7	27.5	34.2	47.3	56.6	69.4	71.1	69.9	65.9	52.1	39.2	33.3	49.4
Detroit	23.2	24.7	32.5	46.3	56.2	69.6	71.2	70.1	65.0	50.3	36.7	30.6	48.0
Dodge City	28.5	28.5	39.8	55.4	62.0	72.0	76.4	74.9	69.8	55.4	40.8	32.5	53.0
Eastport	22.5	22.0	29.6	39.0	47.1	54.1	59.5	60.2	55.8	47.0	38.1	28.0	41.9
Galveston	53.4	54.7	60.4	69.4	74.8	79.9	82.5	81.7	79.9	72.2	63.4	57.9	69.2
Havre	15.0	10.9	25.8	43.6	52.6	59.8	68.1	66.9	55.3	44.3	28.7	21.9	41.1
Kansas City	24.9	29.1	40.2	55.9	62.6	73.4	75.7	75.3	70.8	57.2	40.8	34.4	53.4
Key West	68.0	69.7	72.3	75.3	78.5	81.1	83.1	83.5	82.3	77.9	73.7	70.5	76.3
Marquette	14.2	14.3	24.8	37.1	47.9	61.6	66.1	63.4	59.0	45.7	30.7	22.4	40.6
Memphis	39.7	43.3	50.9	63.3	68.4	77.7	78.2	77.9	73.7	61.4	50.4	44.8	60.8
New Orleans	51.9	56.3	60.6	68.9	74.3	79.1	80.2	80.3	78.3	68.8	50.1	55.8	67.0
New York	30.3	30.9	37.4	49.0	59.1	69.7	73.0	73.1	67.5	54.6	43.4	36.0	52.0
Philadelphia	31.4	32.6	39.2	51.2	61.2	72.1	74.3	74.1	68.3	55.2	43.8	37.0	53.4
Pittsburg	30.3	32.6	39.5	52.3	61.3	72.9	73.2	73.1	68.5	54.0	42.6	37.1	53.1
Portland, Oreg.	38.6	39.0	44.9	48.9	56.3	59.5	65.6	67.2	59.1	52.7	46.1	40.5	51.5
St. Louis	29.8	32.9	43.4	57.2	64.4	76.5	77.3	76.9	72.0	57.5	42.5	37.6	55.7
St. Paul	10.8	13.9	27.9	46.1	56.3	68.2	71.7	69.6	63.5	47.9	28.7	21.2	43.8
Salt Lake City	27.9	29.5	40.6	49.2	58.8	65.7	75.5	75.8	64.9	53.2	41.7	30.1	51.1
San Diego	53.7	54.0	55.1	57.6	60.7	62.8	66.2	68.6	66.7	63.2	58.5	54.5	60.1
San Francisco	49.1	50.6	51.7	52.8	55.6	56.3	56.5	57.6	59.7	57.4	56.5	50.3	54.5
Savannah	49.1	53.3	57.7	65.5	71.4	77.6	79.3	79.6	76.0	66.0	57.0	53.1	65.5
Washington, D. C.	32.5	34.9	41.3	53.5	62.8	73.2	74.5	74.7	68.7	54.7	44.2	37.8	54.4

*Means for 4 years.

ground from which the measurements are made is far below the average roofs of the surrounding buildings. Even in the smaller towns, the open country, and the prairie the anemometer may be considered as being slightly affected by trees, buildings, and inevitable irregularities in the surface of the ground. As a crude approximation, we will assume that the velocity increases as the 0.4 power of one-half the altitude above ground. Under this assumption the standard velocity for 20 feet is given by the formula

$$\frac{v}{V}=\left(\frac{40}{H}\right)^{0.4}$$

The exponent 0.5 would be appropriate for smaller altitudes, and 0.3 for much larger ones, but 0.4 is appropriate for values of H between 40 and 400 feet, and gives us the following table of factors by which the upper velocity V is to be multiplied in order to obtain the velocity at 20 feet:

H	Factor.	H	Factor.
Feet.		*Feet.*	
40	1.000	240	0.468
80	0.758	280	0.459
120	0.644	320	0.435
160	0.574	360	0.415
200	0.525	400	0.398

The special factors for our stations are given in Table 7.

Using these factors we obtain the reduced velocities given in the last column of Table 3. Crude as this reduction is it serves to reduce to a fair degree of uniformity the records of coastal and interior stations and brings out, for instance, with considerable prominence the strong winds at Havre, Dodge City, and Bismarck.

The velocities given in these tables are measurements made with the standard anemometers of the Weather Bureau, these are of the Robinson type, and, according to the investi-

TABLE 6.—*Wind velocity, monthly and annual means.*

Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Bismarck	9.3	10.0	10.6	13.3	11.8	10.6	9.2	8.9	10.5	10.4	10.2	8.9	10.3
Boston	12.1	13.2	13.7	12.3	11.4	10.2	9.8	9.7	9.9	11.6	11.8	12.5	11.5
Buffalo	13.8	13.6	12.5	10.5	9.6	8.4	9.4	8.1	9.7	12.1	13.9	15.0	11.4
Chicago	17.7	19.3	20.1	18.9	17.6	14.0	14.0	13.8	16.7	17.4	18.4	19.4	17.3
Cincinnati	8.0	8.8	8.8	7.7	6.9	5.7	6.0	5.5	5.8	6.7	7.9	7.6	7.1
Cleveland	12.3	13.3	12.5	11.3	11.2	9.5	9.5	9.4	11.7	13.0	14.6	14.2	11.9
Detroit	11.3	12.6	12.2	11.7	10.4	8.9	8.9	8.1	9.8	11.3	12.5	12.7	10.9
Dodge City	9.9	11.0	13.4	15.0	13.5	14.0	11.8	10.4	13.0	10.8	10.7	10.6	12.0
Eastport	13.1	13.5	12.4	10.8	8.9	7.3	6.6	6.9	8.2	10.6	12.2	12.6	10.3
Galveston	11.8	12.6	12.7	12.2	12.1	10.4	9.8	8.3	10.3	10.5	11.4	12.2	11.2
Havre	10.8	10.0	10.3	10.8	10.1	9.4	8.1	7.5	9.6	9.2	11.0	11.7	9.9
Kansas City	8.7	9.6	11.1	9.8	8.5	7.5	7.3	6.6	8.4	8.4	9.4	9.7	8.8
Key West	10.7	11.3	10.8	10.5	8.8	7.3	7.4	6.7	8.0	12.6	11.7	11.9	9.8
Marquette	10.0	10.2	10.1	9.7	10.4	8.2	8.6	8.9	11.4	11.7	11.3	11.4	10.2
Memphis	7.9	8.7	8.7	*8.2	7.3	5.7	5.7	5.7	6.1	6.7	8.2	8.8	7.3
New Orleans	9.2	10.4	10.3	9.7	8.3	7.0	6.4	6.3	7.6	8.7	8.8	9.6	8.5
New York	11.7	13.1	13.4	12.2	11.1	9.1	9.2	8.7	9.5	12.0	12.2	12.7	11.2
Philadelphia	11.1	12.6	12.4	11.4	10.3	9.3	9.1	8.5	9.1	10.5	10.7	10.7	10.5
Pittsburg	7.3	7.6	7.6	7.0	6.1	5.6	5.2	5.0	5.6	6.2	7.4	7.2	6.5
Portland, Oreg.	7.0	7.5	7.7	8.1	7.6	7.1	7.2	6.8	6.9	7.3	8.0	8.9	7.5
St. Louis	12.3	12.4	13.7	12.2	11.4	9.4	9.3	8.2	9.4	10.8	12.2	12.7	11.2
St. Paul	7.4	8.0	8.2	8.9	8.1	7.4	6.5	6.1	7.7	7.9	8.0	7.4	7.6
Salt Lake City	4.6	5.2	6.5	6.7	6.7	6.4	5.9	5.7	6.6	5.3	5.3	5.2	5.8
San Diego	4.5	5.2	5.5	5.3	5.7	5.3	5.0	4.8	5.0	4.4	4.2	4.5	5.0
San Francisco	7.3	7.9	9.2	10.6	11.5	13.3	13.9	12.6	10.9	8.2	6.8	7.6	10.0
Santa Fe	6.8	7.1	8.2	8.7	8.3	8.2	6.9	6.2	6.5	6.3	6.6	6.9	7.2
Savannah	8.4	9.3	8.8	9.0	8.1	7.3	6.9	6.4	6.9	8.3	7.6	7.6	7.9
Washington, D. C.	7.2	8.6	8.6	8.2	6.8	5.6	5.2	4.9	5.2	6.5	7.1	6.5	6.7

gations of Professor Marvin, the indicated velocities of the wind need a considerable reduction in order to obtain the true velocities in standard miles per hour. The error of the Robinson anemometer increases with the gustiness of the wind; the influence of gusts can not be determined *a priori* in detail as they vary their nature so rapidly; it can be determined approximately by comparing the records of anemometers of the same type, but very different moments of inertia. For steady winds, viz, without any very decided gustiness, the indications of the anemometer may be converted into true velocities by a study of the experiments with anemometers revolved on large whirling machines. For the Weather Bureau anemometers having hemispherical cups 4 inches in diameter, and whose centers describe circles of 6.72 inches radius, and after applying a correction for the effect of the average degree of gustiness at Washington, D. C., Professor Marvin deduced the following reduction table by means of which the above indicated velocities at Weather Bureau stations may be converted into approximate true velocities:

Conversion of indicated velocities of winds of average gustiness into true velocities.

(The argument is indicated velocities in miles per hour.)

	0	1	2	3	4	5	6	7	8	9
0	.....	.....	.....	.....	.....	5.1	6.0	6.9	7.8	8.7
10	9.6	10.4	11.3	12.1	12.9	13.8	14.6	15.4	16.2	17.0
20	17.8	18.6	19.4	20.2	21.0	21.8	22.6	23.4	24.2	24.9
30	25.7	26.5	27.3	28.0	28.8	29.6	30.3	31.1	31.8	32.6
40	33.3	34.1	34.8	35.6	36.3	37.1	37.8	38.5	39.3	40.0
50	40.8	41.5	42.2	43.0	43.7	44.4	45.1	45.9	46.6	47.3
60*	48.0	.....	.....	.....	.....	.....	.....	.....	.....	.....

* For velocities above 60 indicated, the necessary observations are still wanting.

For velocities less than 6 miles so much depends upon the condition of the anemometer, as to whether it is well oiled and otherwise in perfect condition, that a table of conversion would have but little significance in daily practice. In general, however, the indicated velocities would be too small; whereas above 6 miles they are too large.

As the corrected figures are not simple multiples of the indicated velocities, but rather logarithmic functions, it follows that when we convert the average of two or more indicated velocities, we obtain a different result from what would be given if the observations were individually converted before the average is taken. In consequence of this, the true velocities obtained by converting the averages given in Table 3 will be appreciably larger than if the conversion had been carried out for each individual velocity before taking the average. As extreme a case as is likely to happen would be that of taking the average of two indicated velocities of 60 and 5 miles per hour, respectively. The average before the conversion is 32.5, which corresponds to 27.6 true velocity. The average after conversion is the average of 48.0 and 5.1, which is 26.55, or 1 mile per hour less than in the previous result. Of course the uncertainty of the true velocities introduced by converting the averages given in Table 3 is far less than 1 mile per hour, and depends principally upon the average condition of the anemometer and the average gustiness of the wind.

TABLE 7.—*Station data for December 31, 1895.*

Stations.	Longitude.	Local time.	Latitude north.	Above ground.			Above sea.			Computed gravity.			Reduction of wind to 30 feet.
				Thermometer.	Anemometer.	Rain gauge.	Ground.	Barometer.	Thermometer.	Sea level.	Station level.	Relative to standard.	
	° ′	*h. m.*	° ′	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Dynes.*	*Dynes.*		*Factor.*
Bismarck	100 38	6 18	46 47	16	29	3	1,670	1,681	1,686	980.759	980.601	1.000004	1.1
Boston	71 04	8 16	42 21	115	181	154	16	125	131	980.356	980.345	0.999743	0.55
Buffalo	78 53	7 45	42 53	103	108	93	606	690	709	980.404	980.340	0.999738	0.7
Chicago	87 37	7 10	41 33	241	274	238	597	824	838	980.314	980.238	0.999634	0.46
Cincinnati	84 30	7 22	39 06	153	157	145	553	628	706	980.065	980.005	0.999396	0.57
Cleveland	81 42	7 33	41 30	122	130	109	649	740	771	980.280	980.211	0.999606	0.6
Detroit	83 03	7 28	42 20	158	161	144	599	724	757	980.354	980.287	0.999684	0.57
Dodge City	100 00	6 20	37 45	44	52	37	2,485	2,504	2,529	979.946	979.712	0.999097	0.9
Eastport	66 59	8 32	44 54	69	74	63	38	76	107	980.588	980.580	0.999983	0.8
Galveston	94 50	6 41	29 18	85	96	80	5	42	90	979.243	979.232	0.998608	0.7
Havre	109 40	5 41	48 34	15	33	2	2,477	2,477	2,492	980.919	980.687	1.000091	1.1
Kansas City	94 37	6 42	39 05	78	95	81	896	963	974	980.063	979.973	0.999364	0.7
Key West	81 49	7 33	24 34	42	50	44	22	22	64	978.967	978.965	0.998335	0.9
Marquette	87 24	7 11	46 34	67	95	58	641	734	708	980.739	980.671	1.000075	0.7
Memphis	90 03	7 00	35 09	140	154	134	672	399	812	979.722	979.684	0.999069	0.57
New Orleans	90 04	7 00	29 58	112	120	111	9	54	121	979.295	979.290	0.998667	0.6
New York	74 00	8 04	40 43	298	326	247	68	314	766	980.210	980.180	0.999575	0.44
Philadelphia	75 09	8 00	39 59	168	184	166	42	117	210	980.140	980.129	0.999523	0.55
Pittsburg	80 02	7 40	40 32	116	123	101	756	842	872	980.189	980.111	0.999504	0.6
Portland, Oreg.	122 43	4 49	45 32	203	213	196	43	157	246	980.645	980.631	1.000035	0.50
St. Louis	90 12	6 59	38 38	110	210	100	469	571	579	980.025	979.972	0.999362	0.50
St. Paul	93 03	6 48	44 58	114	124	93	759	850	873	980.594	980.515	0.999916	0.6
Salt Lake City	111 54	5 33	40 46	83	90	75	4,282	4,345	4,365	980.215	979.809	0.999296	0.7
San Diego	117 10	5 11	32 43	59	70	52	36	69	95	979.517	979.511	0.998892	0.8
San Francisco	122 26	4 50	37 48	161	167	154	26	153	187	979.952	979.938	0.999328	0.57
Santa Fe	105 57	5 56	35 41	47	50	39	6,966	6,998	7,013	979.767	979.112	0.998485	0.9
Savannah	81 05	7 36	32 05	63	86	55	56	98	119	979.465	979.456	0.998836	0.8
Washington, D. C.	77 03	7 52	38 54	49	76	42	80	112	179	980.047	980.037	0.999429	0.8

RECENT EARTHQUAKES.

Although earthquakes have but a very remote connection with meteorology, yet it seems to be expected that the observers of the Weather Bureau will record these, as also aerolites, and that some notice of these phenomena should appear in the MONTHLY WEATHER REVIEW. The Editor of the REVIEW hopes that some geologist will devote himself to the study of the slight tremors and occasional severe quakes that are so frequent throughout the United States, and that he may receive from such an one an authoritative monthly summary of seismic phenomena. For the present he can himself only undertake to give the briefest review of the character of the reports that accumulate monthly in the archives of the Weather Bureau.

There can be no doubt that the solid crust of our globe to a depth of 20 or 30 miles is in a state of strain, and that the strains are perpetually changing as to direction and intensity. Whenever any stratum of rock is too severely strained it must crack or crush suddenly. It may move up or down or sideways, and it may perform several oscillations to and fro before it comes to rest. A break once made in this way makes it easier for succeeding strains to make other breaks in the same locality. In this way mountain chains and great "faults" seem to have been formed. The small shocks that are so frequently experienced represent the minute steps in the process of elevation or depression by reason of which the general surface of the country is slowly rising above the ocean, or it may be occasionally sinking below it. The existence of sedimentary deposits along our coasts is held to be a visible record of the action of the ocean when that region was far below its present level. As large portions of the earth have undoubtedly risen and fallen alternately, though very slowly, through heights of several thousand feet, there have been produced corresponding changes in the climate, the flora and the fauna, and this may easily have gone to extreme limits so that regions that are now habited by man may have been in previous ages uninhabitable, and may in future ages return to that condition. From this point of view the elevations and the changes that are going on form an integral part of meteorology, since that science is often called upon to explain not merely the future weather under present conditions, but the so-called geological climate belonging to the land areas of ancient geological eras.

The principal recent earthquakes, as reported by voluntary observers and by the newspapers were: (The times have been corrected to the eastern or seventy-fifth meridian standard, so far as it was practicable for the Editor to do so, though doubt may remain in the case of a few towns where local rather than standard meridians still continue to be used.)

Sunday, April 25, Arkansas, Okeola.

The United States Consul at Pointe-a-Pitre, Guadeloupe, W. I. (Jacob E. Dart), communicates the details of a very serious earthquake at 10:20 a. m., April 29, at that place. The vibrations lasted five or six seconds, overthrew most of the houses and injured the heaviest walls; 42 persons were injured and 2 killed. It was but little felt on the western portion of Guadeloupe at Basse Terre, and it was most severe on the eastern slope of the mountainous land, especially at Pointe-a-Pitre and at Lamartin, two leagues northeast of that place. A strong quake was also felt at Martinique, about 100 miles to the southeast.

April 30, about 10 p. m., a shock lasting from two to twenty seconds in Tennessee, Illinois, and other points in the Mississippi Valley.

Sunday, May 3.

Virginia.—Blacksburg, 12:14, lasting four or five seconds. Salem, 12:30, eight seconds. Christiansburg, 12:15, thirty seconds. Radford, 12:16, eight seconds, very severe. Wytheville, 12:24, thirty seconds, or 12:20, or 12:15, according to various observers. Roanoke, 12:20, thirty seconds. Fincastle, a few minutes before 1 p. m. Bedford City, 12:25, with a roaring noise. Farmville, no time, feeble shock. Pulaski, 12:20, destructive; chimneys injured. Lynchburg, 12:15, perceptible. Max Meadows and Bluefield, no time given. Harrisonburg, Rocky Mount, Lexington, and Woodstock, not felt.

District of Columbia.—Washington, no tremor noticed by any individual, but one was recorded by the Marvin seismograph at the Weather Bureau at 12:18:45 eastern standard time; the record shows only one shock of sufficient intensity to affect the instrument.

North Carolina.—Winston, 2:17 (which possibly should read 12:17), three or four seconds. Lenoir, 12 m. and 1:00 p. m.

Saturday, May 15.

Nevada.—Carson City, 11:04 a. m., lasting two seconds.

Thursday, May 27.

New York.—North Troy, 10:20 p. m, lasting thirty seconds, then ceased for a few seconds and continued again for fifteen seconds. Albany, 10:20 p. m. Whitehall, Port Henry, and Crown Point, no time. Elizabethtown, 10:15 p. m., lasting nearly two minutes, with a noise like heavy thunder. Glens Falls, 10:15, lasting ten seconds. Saratoga, lasting two minutes. Plattsburg, 10:15 p. m., lasting twenty seconds; worst shock ever experienced here. Fort Edward, no time. Lockport, 10:20 p. m., succession of slight shocks of about two minutes duration. Syracuse, 10:15 p. m., less violent than in northern New York. Antwerp, very heavy. Gouveneur, slight. De Kalb and Canton, severe. Potsdam and Norwood, much heavier. Adams Center, severe. Watertown, 10:15, slight. Remsen, southern limit of the area of the shock. Malone, ten seconds. Carthage, Pulaski, and Mexico, severe. Philadelphia, very severe. Rose, 10:15, one shock lasting several seconds. Whitehall, 10:20 p. m., forty-five seconds. Oswego, 10:30 p. m., Weather Bureau office, slight shocks lasting twenty seconds. Oswego (another report), 10:15, slight vibrations.

Vermont.—Bellows Falls, 10:13, two shocks. Burlington, 10:13 p. m., lasting fifteen seconds; four severe shocks; most severe of any in recent years. Cornwall, 10:15, slight. St. Johnsbury, 10:15. Strafford, 11:00. Vernon, 10:15. Woodstock, 10:15, lasting from five to twenty seconds.

District of Columbia.—Washington, the Marvin seismograph at the Weather Bureau recorded a series of shocks at 10:18 lasting forty-five seconds.

Canada.—Montreal, 10:15 p. m., perceptible rumbles for sixty-five seconds; severer shocks for ten seconds; another rumble at 10:46, but no shock; audiences at theatres greatly frightened. The notable previous shocks in Montreal were on November 27, 1893, March 22 and 26, 1897; the quake was felt throughout the Ottawa Valley and eastern Quebec; it was particularly severe at St. Hiliare Mountain. Ottawa, Ont., 10:15, lasting five seconds; unusually severe. Kingston, shock lasted several seconds.

New Hampshire.—Hanover, 10:15:09 p. m. to 10:15:19, eight or ten severe shocks; followed until 10:16:19 by many minor vibrations and a loud sound, probably due to the rattling of windows and the creaking of objects on the surface of the ground. Concord, 10:15, slight. Keene, 10:15, lasting thirty seconds.

Massachusetts.—Concord, 10:15, slight; lasting fifteen seconds. Fitchburg, 10:15, lasting twenty seconds.

Connecticut.—Hartford, no time given.

Monday, May 31.

South Carolina.—Spartanburg, 1:55 p. m., as severe as Au-

gust, 1886. Statesburg, Dr. W. W. Anderson, voluntary observer, reports the local time 1:36 p. m., whence the seventy-fifth meridian time is 1:57:30; the motion of the floor and its creaking were very distinct.

Georgia.—Atlanta, 1:00 p. m., alarming shake, most severe since 1884; the quake seems not to have extended into the Piedmont region. Savannah, 2:00 p. m. Covington, 1 p. m. Toccoa and Elberton, no time. Hepzibah, 1:05 central time, lasting two seconds.

North Carolina.—Lenoir, 1:58 p. m., loud roar; chimneys injured. Biltmore, 2:00 p. m., perceptible. Henderson, 1.57, severe, lasting ten seconds with a roaring sound. Hatteras, perceptible. Charlotte, 2:00 p. m., lasting fifteen seconds. Soapstone Mountain, rumbling noises. Linville and Waynesville, perceptible. Raleigh, two shocks, each lasting thirty seconds; chimneys thrown down. Greensboro, 2:00 p. m. Asheville, 1:59. Charlotte, 1:45. Throughout the mountain district violent shock. Murphy, lasted two minutes.

Tennessee.—Knoxville and Bristol, 1:15; continued thirty seconds. Chattanooga, 1:30 p. m.; slight shock. Tullahoma, 12:57. Greenville, 2:10. Harriman, 10:00 p. m.; oscillations for two minutes. Chattanooga, 1:00 p. m.; very slight, two shocks; the first at 1:00 p. m., lasting ten seconds, soon followed by a second of shorter duration.

Virginia.—Lynchburg, 1:58. Norfolk, 1:57. Danville, 1:58. Roanoke, it is said that in connection with the recent earthquake Angel Mountain is badly cracked, and nearly all the water drained out of Mountain Lake and the salt wells in Smythe County are completely dried up. Floyd, the severest shock ever felt here; brick and stone walls were cracked. Richmond, 1:59 p. m., violent vibrations and loud noises; two shocks at 1:59 and 2:11 p. m., respectively. Radford, 2:00 p. m. Wytheville, unusual seismic disturbances frequent during the past week in Giles County, causing fissures in the ground. Pearisburg, earthquake shocks nightly in Giles County since the 25th; large fissures have been made. Petersburg, 1:59; quite severe; the first since August, 31, 1889. Newport News, about 2:00 p. m.; brief but violent. Staunton, 1:58, heavy rumble.

West Virginia.—Charleston, 2:00 p. m. Huntington, 2:08 p. m.; the shock lasted ten seconds. Clarksburg, 2:02 p. m., lasting twelve seconds. Hinton, no details. Parkersburg, two shocks between 1 and 2 p. m. Newburg, severe shock. Grafton, windows broken and officials panic stricken.

Kentucky.—Covington, the waters in the lagoon dangerously rough. Louisville, shortly after 2:00 p. m., lasting five seconds. Greensboro, 2:00 p. m.; severe.

District of Columbia.—Washington, the Marvin seismograph at the Weather Bureau recorded a continuous series of shocks from 1:58:15 to 2:03:15, at least fifteen in all, sufficiently severe to make a record on the instrument, which is intentionally set so as not to be too sensitive for fear of its recording surface tremors produced by wagons.

Maryland.—Baltimore, Eastern Shore and southern Maryland; three distinct shocks.

Pennsylvania.—Williamsport, four or five wells have gone dry since the earthquake, which had never before failed. Pittsburg, 1:54 to 1:55 p. m., slight shock; perceptible in buildings, but not on the street.

Ohio.—Cleveland, 12:32 p. m., local time, the seismograph of Prof. Edward W. Morley, of Adelbert College, recorded the vibrations as being from northeast to southwest and about the hundredth part of an inch in extent. The times are not reported. Columbus, 1:02, lasting fifty seconds. Cincinnati, Weather Bureau station, 1:02 p. m., a wave of water started at the southwest extremity of the lake at Ludlow Lagoon, which by the time it reached the eastern shore of the lake was over 3 feet in height. The earthquake shock lasted one minute and a half. The shock was rarely noticed inside of the city. Columbus, 1:02 p. m., for forty seconds, with two distinct shocks. Zanesville, about 1 p. m., alarming vibrations. Cleveland, 12:43, severe shock.

Indiana.—Indianapolis, 1 p. m. Anderson and Vevay, no time.

Sunday, June 20.

California.—Gilroy, 12:11 p. m. Oakland, 12:13 p. m., lasting seven seconds, followed by a milder tremor. At the Chabot Observatory, according to Professor Burchalter, the seismograph showed distinct tremors lasting in all eight seconds, the first one being at 12:13:25 (or thirty-five seconds) p. m. San Francisco, 12:13 p. m., and slight shock at 12:59, and a still slighter one at 6:37 p. m. At the observatory of the Coast and Geodetic Survey a slight shock was observed at 6:37 a. m., and a severe one at 12:15 p. m., after which there were two distinct tremblings and final shock at 12:48 p. m. All these were recorded personally, as the official seismograph was out of order. Sacramento, 12:12, very light. Decoto, 12:13, two heavy shocks; at 12:50 a severe one. Haywards, 12:01, two shocks. Santa Rosa, one shock. Milton, 12:15. Visalia, 12:10, two shocks. Merceda, 12:13, two shocks three or four seconds apart. Modesto, sharp shock. Stockton, at 12:14 p. m. Los Gatos, 12:14 p. m., lasting ten seconds. San Jose, severe and long. Mount Hamilton, Lick Observatory, 12:12:56 p. m., shock from east to west followed by complex movements for twenty seconds. Pacific Grove, 12:15 p. m., continuing for several minutes. Monterey, heavy shock; the adobe wall of the San Carlos Mission thrown down. Del Monte, three shocks, preceded by a rumbling. Templeton, 12.15 p. m., lasting twelve seconds. Santa Crux, 12:13, a severe shock, and an hour later a lighter one. Salinas, 12:15, the severest shock on record, lasting thirty seconds. Courthouse, brick buildings, and chimneys injured. Gilroy, 12:11 p. m., heaviest shock ever felt here, except that of 1868; lasted only a few seconds; chimneys and brick walls badly injured. Hollister, 12:15, severest shock since 1868, lasting fifteen seconds, from north to south; all brick buildings injured, and several badly damaged. San Rafael, slight shocks at 12:14 and 12:56. Gonzales, very heavy. Fresno, earthquake lasting from three to ten seconds. Sacramento, very slight. Redwood City, severe. Watsonville, heaviest since 1881. In general the reports seem to show that the shock was heaviest and most damaging in the neighborhood of Hollister, San Juan, and Salinas, and it would be important to ascertain whether the coast line on either bank of the San Benito River shows any change of altitude in that region, or in the Bay of Monterey and the Peninsula of Santa Cruz.

Mexico.—At Oaxaca two shocks were felt on the 20th and one at 3 a. m. of the 21st in continuation of the disastrous earthquake that destroyed Tehuantepec a few days before. There is no apparent connection between these earthquakes in the Andes, Cordilleras, and Rocky Mountains and the formation of new volcanoes, notwithstanding the numerous popular reports to the contrary, but there is much reason to think that these closely associated shocks in Central America, Mexico, and California were part of the same shifting of geological strata.

Washington, D. C., June 28.—The seismograph at the Weather Bureau in Washington showed record of a slight shock of earthquake at 11:28 p. m., standard time, June 28. This must have been a single slight shock barely sufficient to make one record. Earthquakes of greater intensity are characterized by a succession of several shocks sufficient to make a record on the Marvin seismograph, between which may occur numerous gentler oscillations or milder shocks or slow tippings of the earth to and fro, such as this apparatus is not designed to record.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletin Mensual;* an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW during 1896. The altitudes occasionally differ from those heretofore published, but no reason has been assigned for these changes. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart III.

Mexican data for June, 1897.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Barrousse (Coahuila)	5,413	.....	86.9	66.4	75.7	.....	2.36	.....	.....
Carneros (Coahuila)	.....	.....	85.3	59.0	68.5	.....	3.74	.....	.....
Culiacan	112	29.67	98.6	72.5	86.4	48	0.37	w.	e.
Guanajuato	6,761	23.67	91.2	55.0	69.4	55	6.39	ene.	ne.
Leon	5,934	20.34	91.2	56.3	72.9	52	5.56	ene, ese.	ene.
Linares	1,188	.....	99.0	66.2	83.3	.....	1.26	sse.	.....
Magdalena (Sonora)	4,948	.....	97.9	72.0	82.8	.....	T.	sw.	n.
Merida	50	29.89	101.1	71.2	82.4	76	3.63	e.	e.
Mexico (Obs. Cent.)	7,472	23.07	84.2	50.4	64.6	65	5.47	nw.	ne.
Mexico (E. N. de S.)	.....	23.09	84.2	47.3	62.4	60	5.67	sw.	.....
Monclova	.....	.....	104.4	64.8	86.5	.....	1.77	.....	.....
Morelia (Seminario)	6,401	23.96	78.3	53.2	64.4	72	4.79	sse.	ne.
Oaxaca	5,164	25.06	90.7	55.8	72.0	73	9.98	nw.	ne.
Parras (Coahuila)	3,986	.....	97.7	66.6	80.1	.....	4.92	.....	.....
Puebla (Col. Cat.)	7,112	23.37	81.7	53.6	66.6	71	4.68	e.	nw.
Queretaro	6,070	24.17	86.4	55.6	70.0	59	4.09	e. ene.	.....
Saltillo	5,399	24.76	97.0	59.9	74.1	52	1.61	s.	.....
San Luis Potosi	6,202	24.13	85.1	56.7	69.4	60	4.66	e.	e.
Sierra Mojado (Coah)	.....	.....	96.3	59.0	79.0	.....	2.17	.....	.....
Silao	6,063	24.24	85.1	64.0	73.6	61	4.12	ene.	w.
Toluca	8,612	21.91	77.9	46.4	61.5	67	3.58	ese.	ne.
Torreon (Coahuila)	3,720	.....	107.6	68.4	88.7	.....	4.53	.....	.....
Trejo (H. d. S., Gto.)	6,011	.....	.....	.....	.....	.....	3.60	ne.	.....
Tuxtla Gutierrez	1,864	28.06	98.6	66.2	78.6	81	10.83	nw. nnw.	.....
Zacatecas	8,015	22.53	84.0	47.1	65.7	54	7.06	e.	e.
Zapotlan (Seminario)	5,078	25.06	90.0	58.6	73.8	63	8.81	se.	se.

Mexican data for April, 1897.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Aguascalientes	6,119	23.84	85.6	41.7	64.4	21	0.00	w.	se.
Barousse (Coahuila)	5,413	.....	84.2	47.3	73.4	.....	0.39	.....	.....
Carneros (Coahuila)	.....	.....	83.7	47.1	61.9	.....	0.98	.....	.....
Colima (Seminario)	1,656	28.27	96.8	55.0	75.4	55	0.00	sw.	w.
Colima	.....	.....	.....	.....	78.8	.....	.....	.....	.....
Culiacan	112	29.71	95.0	58.1	78.3	47	0.00	w.	e.
Guadalajara (O. d. E.)	5,186	24.97	92.1	50.2	72.3	84	.....	.....	sw., nw.
Guanajuato	6,761	23.67	89.1	51.3	70.2	31	0.26	wsw.	sw.
Jame (Coahuila)	.....	.....	80.1	29.7	56.3	.....	T.	.....	.....
Lagos	6,275	24.12	84.4	51.1	68.7	34	T.	nw.	nw.
Leon	5,934	24.28	89.6	49.3	71.4	27	0.02	wsw.	.....
Magdalena (Sonora)	4,948	.....	90.0	50.0	72.1	.....	0.00	n.	n.
Mazatlan	25	29.92	81.9	63.7	73.8	78	0.00	nw.	sw.
Merida	50	29.92	102.2	63.7	81.5	63	0.52	se.	w.
Mexico (Obs. Cent.)	7,472	23.00	85.6	45.5	65.5	42	1.22	nw.	sw.
Mexico (E. N. de S.)	.....	23.08	83.3	46.0	62.6	40	1.23	nw.	.....
Monterey	1,626	28.13	96.8	45.5	74.1	57	0.98	ne.	ne.
Morelia (Seminario)	6,401	23.97	86.7	52.0	68.9	41	0.00	ssw.	e.
Oaxaca	5,164	25.05	94.8	46.8	74.5	55	1.21	sse.	sw.
Pachuca	7,956	22.56	83.5	39.9	62.1	47	0.46	nne.	.....
Parras (Coahuila)	3,986	.....	92.3	50.5	70.0	.....	0.79	.....	.....
Pareta, La. (Coahuila)	.....	.....	99.7	52.3	75.6	.....	T.	.....	.....
Puebla (Col. Cat.)	7,112	23.36	86.0	45.3	69.4	45	0.41	e.	sw.
Saltillo (Col. S. Juan)	5,399	24.78	91.6	44.2	66.4	51	0.39	n.	sw.
Silao	6,063	.....	.....	.....	.....	.....	.....	.....	.....
Sierra Mojada (Coah)	.....	.....	88.5	53.8	67.5	.....	.....	.....	.....
Tacubaya (Obs. Nac.)	7,630	.....	.....	.....	.....	.....	.....	.....	.....
Tampico (Hos. Mil.)	38	.....	.....	.....	.....	.....	.....	.....	.....
Tehuacan	5,453	.....	.....	.....	.....	.....	.....	.....	.....
Toluca	8,612	21.91	80.8	41.2	61.2	42	0.24	w., se.	.....
Zacatecas	8,015	22.52	82.4	41.0	64.6	39	0.00	sw.	w.
Zapotlan (Seminario)	5,078	25.08	90.0	50.0	74.5	36	T.	sse.	sw.

SEISMOGRAPHS AT METEOROLOGICAL STATIONS.

In order to disabuse the public mind as to the connection between the weather and earthquakes and in order to show that the study and prediction of earthquakes may become practicable under the guidance of expert geologists, it is desirable that, at least temporarily, there be established self-registering seismographs and seismoscopes under the care of reliable physicists and painstaking meteorological observers. The physicists may establish and care for the complex seismographs, but the meteorological observers can easily look after the seismoscopes as they are comparatively simple.

As Professor Marvin's form of self-registering apparatus is simple and has stood the test of actual use for several years, there can be no doubt but that it is eminently adapted to its purpose and worthy of wide dissemination. The seismoscope, the clock, the recording cylinder, and the installation would probably cost about $150.

CLIMATE AND CRIME.

The public press has lately given much attention to the subject of the relation between weather and crime. This seems to have started with a private communication from some Weather Bureau observer and has greatly interested every one. A preliminary collection of statistics seems to indicate that crime is more prevalent in hot weather.

The Chief of the Weather Bureau has expressed his opinion that it is utterly wild to contemplate at present the possibility of issuing predictions of prevalence of crime, and he has no intention of attempting it. In fact, there is no official investigation of the subject being made or contemplated in the Weather Bureau and no legal authority for doing so, even if it were considered desirable, which it is not. The statistics of disease have generally shown a very broad connection between climate and disease and the investigation of that subject is ordered by Congress, but that has no official connection with crime. The discussion of such difficult subjects is a matter of the careful study of statistics by physicians, and any conclusions that may at first seem to be justified need to be checked by later investigations before they can be practically applied to the public welfare.

CLIMATOLOGICAL DATA FOR JAMAICA, W. I.

Through the kindnessof Mr. Maxwell Hall, of Montego Bay, Jamaica, the meteorological service of that colony has acceded to the request of the Editor for the prompt communication of an abstract of the very interesting climatological records of that highly important West Indian station. The climatological summary for June, 1897, furnished by Mr. Hall through his assistant, J. F. Brennan, of the Meteorological Office, is reproduced in the following table. The stations therein mentioned have the following locations:

Stations.	Altitude.	Latitude.	Longitude.
	Feet.	° ′	° ′
Moran Point Lighthouse	8	17 56	76 10
Negril Point Lighthouse	33	18 16	78 23
Kingston	50	17 58	76 48
Kings House	400	.....	.....
Castleton Gardens	580	18 12	76 50
Hope Gardens	600	.....	.....
Stony Hill Reformatory	1,400	.....	.....
Hill Gardens (Cinchona Plantation)	4,907	18 5	76 39

The stations King's House, Hope Gardens, and Stony Hill Reformatory, are near Kingston, and are not supplied with mercurial barometers. The barometric pressures as given for these Jamaica stations are reduced to the standard instrumental temperature (32° F.) and standard gravity (latitude 45° and sea level), and all except Hill Gardens are also reduced to sea level. The thermometers are exposed in Stevenson Screens, and their readings have been corrected for

instrumental errors. The wind movement is measured by Robinson anemometers, assuming the factor 3. The amount of cloud is given in tenths of the whole sky; the lower clouds are for the most part fracto-stratus; the middle clouds cumulus, and the upper clouds cirrus or cirro-stratus.

The observations at 7 a. m. and 3 p. m. at Kingston and Hill Gardens are also communicated in detail by Mr. Hall, but are not published at present, although eventually this may be done, as Hill Gardens is, like Blue Mountain, an interesting mountain station, for comparison with its near neighbors, Castleton Gardens and Kingston. The direction of the wind at the upper station is only given in general terms for the day, and is, in general, east-southeast, while at Kingston it is south-southeast.

The general direction of the middle clouds, as observed at 7 a. m. and 3 p. m., at Kingston, is southeast, but the velocity at the upper station is so much less than at the lower, viz, 19 miles as compared with 119, that one must infer that the upper station is greatly sheltered from the free wind by the summit of the hill above it which is said to attain an attitude of about 6,300 feet. If a mountain summit station can be obtained this also will be published. Many details with regard to the climate of Jamaica will be found in Mr. Hall's contributions to the official handbook published by the Government of that island in 1881.

The important mutual relations between the meteorology of the West Indies and the southern portion of the United States must stimulate the study of these records from Jamaica.

Jamaica, W. I., climatological data, June, 1897.

	Morant Point Lighthouse.	Negril Point Lighthouse.	Kingston.	Kings House.	Castleton Gardens.	Hope Gardens.	Stony Hill Reformatory.	Hill Gardens (Cin. Plant).
Elevation (feet)	8	33	50	400	580	600	1,400	4,907
Mean barometer 7 a. m.	.....	29.940	29.955	.....	.....	.....	.....	25.253
Mean barometer 3 p. m.	.....	29.912	29.907	.....	.....	.....	.....	25.222
Mean temperature 7 a. m.	.....	79.2	79.3	74.5	73.0	74.3	73.0	63.5
Mean temperature 3 p. m.	.....	83.3	86.5	88.1	84.5	86.7	81.6	67.6
Mean of maximum	.....	87.6	89.1	92.5	89.1	89.9	84.8	71.0
Mean of minimum	.....	73.0	74.5	67.6	64.7	69.5	67.8	59.0
Highest maximum	.....	90	92	98	92	95	89	76
Lowest minimum	.....	71	72	65	62	68	66	57
Mean dew-point 7 a. m.	.....	72.3	70.0	70.8	69.8	69.9	69.0	58.8
Mean dew-point 3 p. m.	.....	79.5	71.4	75.8	71.4	71.6	73.6	62.2
Mean relative humidity 7 a. m.	.....	75	73	87	90	87	87	83
Mean relative humidity 3 p. m.	.....	78	61	67	62	61	77	81
Monthly rainfall (inches)	4.60	5.58	0.58	0.54	4.31	1.10	2.45	0.91
Average daily wind movement	.....	225.8	119.0	.....	.....	.....	.....	18.6
Average wind direction 7 a. m.	.....	n. e.	n.	.....	.....	.....	.....	.....
Average wind direction 3 p. m.	.....	var.	s. e.	.....	.....	.....	.....	.....
Average hourly velocity 7 a. m.	.....	6.5	1.4	.....	.....	.....	.....	.....
Average hourly velocity 3 p.	.....	12.2	9.2	.....	.....	.....	.....	.....
Average cloudiness:								
7 a. m. Lower clouds	.....	0.7	0.5	.....	.....	.....	.....	.....
7 a. m. Middle clouds	.....	0.6	0.8	.....	.....	.....	.....	.....
7 a. m. Upper clouds	.....	5.9	3.6	.....	.....	.....	.....	.....
3 p. m. Lower clouds	.....	5.6	1.0	.....	.....	.....	.....	.....
3 p. m. Middle clouds	.....	2.6	1.2	.....	.....	.....	.....	.....
3 p. m. Upper clouds	.....	0.5	3.6	.....	.....	.....	.....	.....

HOT WINDS IN MISSOURI.

The voluntary observer, George Comly, at Willow Springs, Howell Co., Mo. (N. 37° 00′, W. 91° 55′), under date of June 25, writes:

At 5:40 a. m. (probably central time) to-day, an exceedingly hot wave struck this place, lasting forty minutes, from the west, causing a rise in temperature of 20°, rising from 65° to 85° at 6:15, then going down again to 68° at 7 o'clock.

Somewhat similar occurrences have been recorded, not only over the greater portion of the Mississippi watershed, but in other parts of the world. At the time noted by Mr. Comly, Missouri and the adjacent country was covered by an area of cloud and rain. Northerly winds prevailed from northern Missouri to Canada, and southerly winds prevailed from southern Missouri to the Gulf. A temperature of 65° F. prevailed to the north of Willow Springs, and a temperature of 80° prevailed at Little Rock and Fort Smith, or about 150 miles to the South. But a temperature of 85° does not appear in any region near by. It is not necessary to suppose that the hot wave observed by Mr. Comly was due to the strictly horizontal movement of hot air from some distant point. Such a motion, at the rate at which the wind was then blowing, or scarcely 10 miles an hour, would have consumed at least ten or fifteen hours to pass over the intervening territory, and would have been observed by many others besides Mr. Comly. The explanation of these local hot winds has been frequently given in connection with the Foehn winds of Switzerland, of Table Bay, the dry chinook of Montana, and the hot winds of Kansas. Any comparatively small mass of air that is rapidly descending warms up by compression faster than it can cool off by radiation, and when it reaches the earth's surface spreads out as a local hot wave. If the upper air is moving from the west and sends a portion down to the earth's surface, the latter will appear as a hot wave moving from the west. This descent and hot wave may occur at any time, morning, noon, or night, and at any season of the year, summer or winter, and is the proper explanation of many of the phenomena of oppressive hot weather that accompany thunderstorms, tornadoes, and all such storms as have their origin in rapid vertical movements, which have been called topsy-turvy movements by Chambers in his analysis of the climate of Madras. At Cape Town, South Africa, where a heavy southwest wind, blowing over Table Mountain, descends in whirling gusts upon the town and the bay, the Editor, in 1890, observed quite accurately and on many days at certain hours, the rapid movement of alternate gusty streaks of hot, dry, and cold, moist air. The latter streaks represented the air that had passed around the mountain or was resting quietly over the bay, while the hot streaks represented air that had descended rapidly from the top of the mountain, and which blew violently at the topmast of the vessel two or three seconds before it reached the observer on deck. The measured alternations of temperature were plus or minus 4° F. in three minutes of time, but owing to the internal sluggishness of the best thermometers it is certain that the actual alternations of temperature were much greater, and, in fact, the sensations of feeling seemed to the observer to correspond to sudden changes of at least 10°.

In thunderstorms of that class which consist of an advancing roll of air rising in the front and descending in the rear, one will almost always notice the sensation of heat for a short time after the storm has passed, and before the mass of cool, dry west wind has succeeded in pushing the thunderstorm area entirely away.

HOT WINDS IN KANSAS.

Mr. P. A. Pearson, postmaster at Kinsley, Kans. (N. 37° 50′, W. 99° 20′ and, therefore, about 30 miles east-northeast of the regular Weather Bureau station at Dodge City), communicates the following note:

On June 23, about 12:30 a. m., an oppressive hot wind from the northwest prevailed. One who faced the wind had to gasp for breath. After a few seconds there would be a calmness that can only be described as a deathly stillness, no less oppressive than the wind. At 1:20 a. m. the thermometer registered 94°; at 1:38, 91°; at 1:50, 80° F. I have no doubt but that the temperature between 12:30 and 12:40, when it was at its maximum, was as high as 115° or 120°.

There was a heavy bank of cloud southwest of Kinsley and I am of the opinion that a cyclone (tornado?) passed high above us. The board sidewalks were so hot that they burned the bare feet of those who stepped on them about the same as if in the hot sunshine of midday.

The local newspapers at Larned, Kans. (N. 38° 10′, W. 99° 5′, therefore, about 25 miles northeast of Kinsley), says:

On Tuesday night between 2 and 4 a. m., that is to say, Wednesday, June 23, many people were awakened about 2 a. m. by the extraordinary heat of the air, it being so intense that many thought their houses to be on fire; those who noticed the direction in which the hot wave was moving say it came from the southwest to the northeast and then came back from the northeast to the southwest. A pleasant cool breeze from the north had been blowing up to 1 a. m. that night and it commenced again to blow about 5 a. m.

The 8 a. m. weather map of the 23d shows mostly southerly winds, clear sky, and falling barometer in Kansas; so that a local northerly wind at Larned would imply a local topsy-turvy movement such as would characterize a streak of hot winds extending from Kinsley to Larned.

BRIGHT METEOR.

A bright meteor passed over Augusta, Kans., on June 20, about 10:45 p. m. (probably central time) traveling due west. Two or three minutes after passing over there was a loud explosion like a heavy clap of thunder. The color of the meteor was bright blue.

In addition to the preceding report received directly from the postmaster at Augusta (long. 96° 57′ W., lat. 37° 40′ N.) there have been received newspaper reports from other stations, as follows:

Eldorado, Kans. (N. 37° 44′, W. 97° 50′)—Path from west to east; principal meteor followed by a number of smaller lights; heavy explosive noise from two to four minutes after the meteor disappeared.

Wichita, Kans. (N. 37° 40′, W. 97° 20′)—Appeared at 10:50 in the southeast at an altitude of about 60°; path toward the northwest where it disappeared on the horizon like a bright glowing coal, passing near the zenith; two minutes afterwards there was a sharp heavy report that died away in a low rumbling sound. Persons living 17 miles to the northwest (lat. 37° 50′, long. 97° 33′) saw it fall.

Winfield, Kans. (N. 37° 15′, W. 96° 58)—Brilliant meteor athwart the sky about 11 p. m., followed by a rumbling noise.

Hutchinson, Kans. (N. 38° 3′, W. 97° 56′)—Meteor of great brilliancy at 10.45. Apparent path from east to west.

Emporia, Kans. (N. 38° 53′, W. 96° 8′)—Enormous meteor passed over the city about 11 p. m., disappearing in the southwest.

Ardmore, Ind. T. (N. 34°, 10°, W. 97°, 5′)—Just before 11 p. m. a large meteor appeared in the northeast and apparently struck the earth in the northwest; it appeared as large as the moon and gave a light almost equal to that of day.

From these few reports, elementary as they are, we can only conclude that the meteor must have been moving nearly east and west when first seen. It must have been at least 5 miles above the surface of the earth since it was visible from Ardmore, which is about 210 miles south of the vertical plane through its path. But the record at Ardmore shows that it appeared to pass from northeast to northwest, and, if this is strictly true then its path must have been from the northeast toward Kansas, where it turned westward and eventually northwestward and its height above the ground, when passing over the stations in Kansas, must have been at least 30 or 40 miles. If numerous other and more accurate observations can be secured, it will be worth while for those interested in meteors to compute more accurately the path of this body. In general, of course, we know that a myriad of such masses, large and small, are moving swiftly through the space between the earth and the surrounding stars, and we see only those that for a few seconds pass into our own atmosphere. To the meteorologist these objects have considerable interest, as they reveal the presence of a considerable quantity of air at the height of 50 miles above the earth, where the barometric pressure would be less than 0.001 of an inch, and would, therefore, be called inappreciable in our ordinary terrestrial meteorology. Notwithstanding the thinness of the atmosphere at this elevation, we see that an immense noise can be produced in it and propagated through it. The violence of the atmospheric concussion is, in fact, inconceivable; if we try to reproduce it by the mechanical production of sound inside of a vessel from which the air has been exhausted, we shall find it impossible to do so. The intensity of a sound as it passes from a lighter to a denser medium experiences an apparent diminution. As our lower atmosphere is more than thirty thousand times as dense as that in which the meteor made its tremendous noise, so the latter must have been thirty thousand times as intense as the noise of the explosion heard by the observers in Kansas.

METEOROLOGICAL TABLES.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of tables and charts see page 166 of REVIEW for April, 1897.

TABLE I.—*Climatological data for Weather Bureau Stations, June, 1897.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Mean actual, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.					Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.																														
Eastport	76	69	74	29.81	29.90	— .03	60.1	— 2.5	70	26	60	42	8	46	32	49	46	82	5.11	+ 0.2	14	6,173	s.	44	e.		5	5	14	11	6.8	
Portland, Me	103	81	89	29.79	29.89	— .05	58.2	— 2.1	83	25	66	44	8	51	35	53	48	75	3.32	— 0.2	14	4,905	nw.	27	nw.	26	7	6	17	6.7	
Northfield	872	15	59	28.99	29.92	— .01	57.4	— 4.1	83	25	67	36	21	46	35	54	49	72	4.97	+ 1.6	13	5,994	n.	32	n.	16	2	16	12	6.9	
Boston	125	115	181	29.79	29.93	— .03	62.3	— 3.7	87	26	69	46	2	54	36	56	51	71	3.77	+ 0.2	10	5,994	n.	30	sw.	3	10	7	13	5.7	
Nantucket	14	43	54	29.94	29.95	— .05	60.0	— 0.6	76	26	65	50	*	55	17	57	55	88	4.46	+ 1.4	11	7,990	w.	30	sw.	10	10	4	16	6.5	
Woods Hole	.....	51	57	.....	.....	.....	60.0	— 2.3	73	16	65	49	8	56	16	.....	.....	.....	2.05	— 0.5	6	7,907	sw.	37	ne.	1	14	8	8	4.6	
Vineyard Haven	.....	20	.....	.....	.....	.....	63.0	— 3.1	80	19	71	50	2	56	16	.....	.....	.....	2.83	+ 0.6	9	10,232	sw.	38	w.		12	10	8	.....	
Block Island	27	39	48	29.92	29.95	— .04	60.2	— 0.9	78	30	66	49	2	55	16	56	54	83	3.06	+ 0.5	7	10,467	sw.	38	ne.	10	10	14	6	5.1	
Narragansett Pier	.....	10	.....	.....	.....	.....	60.7	— 2.8	85	30	70	43	1	53	29	.....	.....	.....	2.56	0.0	10	.....	sw.	.....	.....		19	4	7	.....	
New Haven	107	118	140	29.83	29.94	— .05	61.8	— 2.8	85	30	70	43	2	55	28	58	53	71	2.47	— 0.5	10	6,101	sw.	35	nw.	1	13	6	11	5.2	
Mid. Atlan. States.							63.9	— 1.4	88	25	73	44	2	55	28	58	53	71	2.34	— 0.9												
Albany	97	84	113	29.84	29.95	.00	69.2	— 1.7											4.45	+ 0.8	12	5,604	s.	26	s.	3	11	11	8	5.5	
Binghamton	875	79	90	.....	29.96	— .03	64.6	— 3.2	85	25	74	48	2	55	30	58	53	71	2.93	.....	14	4,185	nw.	24	nw.	15	13	8	9	5.1	
New York	314	298	326	29.63	29.98	— .03	60.9	.....	85	25	73	48	1	58	21	58	53	66	2.98	— 0.2	9	9,079	nw.	53	nw.	1	9	12	9	5.5	
Harrisburg	377	94	102	29.85	29.97	— .03	65.2	— 3.1	86	25	73	48	2	58	25	60	54	66	1.83	— 2.4	11	4,490	w.	30	w.	1	4	15	11	6.1	
Philadelphia	117	168	184	29.85	29.97	— .02	67.2	— 3.3	91	30	76	47	2	58	26	60	54	66	4.53	+ 1.4	11	7,253	nw.	38	nw.	15	7	12	11	6.1	
Atlantic City	52	68	76	29.92	29.97	— .03	68.9	— 2.9	91	30	78	49	2	60	26	60	55	66	2.62	— 0.6	12	7,478	sw.	39	n.	1	7	16	7	5.5	
Baltimore	123	68	82	29.84	29.97	— .03	65.6	— 1.0	92	30	79	48	2	59	24	62	56	65	2.57	— 1.4	12	3,439	nw.	32	w.	4	9	10	11	5.4	
Washington	112	59	76	29.87	29.99	— .02	70.1	— 2.2	95	30	79	43	2	60	31	64	60	75	2.60	— 1.4	11	4,592	nw.	25	nw.	4	4	10	16	.....	
Cape Henry	.....	5	34	.....	.....	.....	69.6	— 1.9	93	30	80	60	*	66	27	.....	.....	.....	2.09	— 1.9	11	.....	se.	.....	.....	.....	.....	.....	.....	.....	
Lynchburg	685	83	88	29.27	29.99	— .03	73.3	+ 0.8	96	16	83	49	2	63	32	65	61	70	2.70	— 0.8	16	2,694	ne.	27	nw.	19	10	12	8	5.2	
Norfolk	57	88	93	29.94	30.00	— .02	73.1	— 1.1	96	16	83	49	2	66	25	67	64	75	1.98	— 2.2	13	5,350	se.	46	nw.	20	7	9	14	6.0	
S. Atlantic States.							74.2	+ 0.7	96	*	82	58	2	66					4.30	— 0.8												
Charlotte	773	67	76	29.19	29.99	— .04	73.5	+ 1.6											3.63	— 1.0	12	4,143	e.	32	w.	4	12	15	3	4.5	
Hatteras	11	17	36	30.00	30.01	— .02	76.6	+ 0.8	96	30	87	60	2	66	38	68	64	72	5.76	+ 1.2	13	7,905	sw.	34	nw.	24	13	13	4	4.4	
Kittyhawk	9	12	30	29.97	29.98	— .03	74.4	+ 0.9	85	26	79	59	14	66	37	69	67	83	3.90	— 0.7	9	9,288	ne.	48	ne.	13	13	10	7	4.0	
Raleigh	375	93	101	29.62	30.01	— .02	72.6	— 1.0	94	30	79	59	14	66	36	68	64	84	3.44	— 2.0	15	4,234	sw.	23	w.	4	8	17	5	5.4	
Wilmington	78	82	88	29.93	30.01	— .02	76.6	+ 1.8	96	30	86	58	*	70	23	71	69	80	3.88	— 1.8	10	5,521	w.	28	w.	12	13	15	2	3.8	
Charleston	48	60	72	29.99	30.04	.00	78.0	+ 1.5	96	30	86	64	*	70	23	73	71	78	5.47	— 0.2	14	6,902	sw.	44	nw.	25	4	23	3	5.0	
Columbia	.....	5	.....	.....	.....	.....	80.4	+ 1.6	96	25	87	68	9	74	29	.....	.....	.....	4.43	+ 0.3	14	.....	e.	.....	.....	.....	.....	6	18	6	.....	
Augusta	180	89	103	29.81	30.00	— .01	79.8	+ 1.7	100	30	91	57	9	68	29	73	70	77	3.56	— 1.0	12	3,924	s.	38	nw.	8	11	10	9	5.2	
Savannah	98	63	86	29.92	30.02	— .02	81.4	+ 2.6	100	30	92	62	8	71	27	74	72	77	3.94	— 2.7	15	5,147	sw.	40	nw.	8	11	10	9	5.2	
Jacksonville	43	69	84	29.98	30.03	— .01	81.8	+ 3.0	100	15	92	61	8	72	27	75	73	79	5.01	— 0.4	12	5,198	sw.	36	nw.	20	11	16	3	4.5	
Florida Peninsula.							83.4	+ 3.4	99	28	94	68	20	73	27	75	73	79	5.03	— 1.0												
Jupiter	28	13	30	30.03	30.06	+ .01	81.4	+ 0.5											4.67	— 2.0	9	5,017	s.	32	w.	21	3	18	9	6.5	
Key West	22	42	50	30.05	30.07	+ .03	81.0	+ 1.2	93	21	86	71	*	76	22	76	74	82	4.259	se.	32	n.	8	7	16	7	5.3			
Tampa	36	60	68	30.02	30.06	+ .02	82.2	— 0.6	90	25	86	70	8	79	13	76	73	78	4.046	se.	26	se.	29	13	15	2	3.6			
East Gulf States.							81.0	— 0.8	94	19	90	68	10	72	22	75	73	78	8.46	+ 0.9	15											
Atlanta	1,131	92	126	28.86	30.02	— .03	81.0	+ 2.1											2.96	— 2.1												
Pensacola	56	78	90	29.96	30.02	— .01	78.6	— 2.9	97	30	89	58	1	68	30	68	63	64	2.07	— 2.2	11	5,638	nw.	36	sw.	30	11	16	3	4.7	
Mobile	57	88	96	29.97	30.03	+ .01	81.0	— 1.5	98	21	87	69	6	75	32	75	72	76	2.03	— 3.3	5	6,448	sw.	40	ne.	26	14	13	3	4.2	
Montgomery	221	100	107	29.76	29.99	— .04	80.8	— 1.3	98	19	89	65	9	72	25	74	71	76	4.09	— 1.8	11	4,390	nw.	54	nw.	19	20	10	5	4.5	
Vicksburg	254	65	73	29.73	29.98	— .04	82.6	— 3.1	100	23	94	63	7	71	30	71	68	71	3.79	— 0.9	11	4,095	w.	38	nw.	3	17	11	2	2.9	
New Orleans	54	112	120	29.96	30.02	+ .02	80.6	— 1.3	96	22	90	63	6	72	25	71	68	72	3.93	— 0.4	7	3,542	sw.	24	se.	26	11	8	11	3.5	
Port Eads	.....	27	.....	.....	.....	.....	81.8	— 1.6	98	*	89	69	*	74	24	74	70	72	4.82	— 1.8	11	4,856	se.	.....	.....	.....	4	25	1	.....	
West Gulf States.							82.6	+ 2.7	94	20	88	72	5	78	17	.....	.....	.....	0.00	— 4.2	0	.....	e.	.....	.....	.....	.....	.....	.....	.....	
Shreveport	249	77	84	29.73	29.98	— .01	80.1	+ 0.6											2.66	— 1.2												
Fort Smith	481	63	72	29.44	29.94	— .01	80.4	— 0.4	99	21	90	61	8	71	23	72	69	73	3.03	— 0.8	8	4,484	s.	29	sw.	28	17	5	8	3.9	
Fort Smith	302	71	79	29.68	29.99	+ .01	78.0	+ 1.2	96	22	88	55	4	68	28	71	67	67	3.98	— 0.4	8	4,393	e.	44	s.	23	19	4	7	3.9	
Little Rock	302	71	79	29.95	29.97	+ .01	78.9	+ 1.4	100	22	89	56	5	69	28	70	65	84	3.06	— 1.3	8	4,438	sw.	48	n.	3	10	17	3	4.6	
Corpus Christi	20	42	50	29.98	30.02	+ .03	80.6	0.0	98	21	85	65	4	76	16	76	75	81	1.81	— 0.9	5	10,473	se.	46	nw.	4	16	11	3	3.4	
Galveston	42	85	96	29.96	30.02	+ .01	80.6	0.0	96	21	86	66	3	78	18	76	74	81	0.37	— 4.5	1	8,041	s.	50	nw.	4	3	23	7	0	2.1	
Palestine	510	54	61	29.46	30.00	— .01	79.4	+ 0.9	98	21	89	59	8	70	27	71	69	77	4.16	— 0.1	12	4,386	se.	40	nw.	6	9	16	5	4.9	
San Antonio	704	95	104	29.21	29.94	— .01	81.4	+ 0.9	99	22	92	61	8	71	31	72	67	69	2.19	— 0.5	6	7,106	se.	50	n.	3	16	11	3	3.8	
Ohio Val. & Tenn.							73.0	+ 0.2											3.14	— 1.1												
Chattanooga	762	106	112	29.23	30.02	— .02	77.4	+ 1.9	96	30	88	54	1	67	32	68	63	66	1.03	— 3.8	8	4,441	ne.	44	sw.	28	11	18	1	4.4	
Knoxville	980	80	88	29.01	30.02	— .01	75.0	+ 1.5	94	23	88	57	1	68	27	69	64	64	3.18	— 0.9	14	3,254	nw.	28	w.	3	13	15	2	4.4	
Memphis	399	140	154	29.43	29.99	.00	78.2	+ 0.7	95	14	87	51	1	66	33	66	61	61	2.50	— 2.2	9	5,704	sw.	46	nw.	19	16	13	1	3.5	
Nashville	545	128	134	29.95	29.98	.00	76.8	+ 1.5	96	14	87	50	1	62	31	64	59	65	1.82	— 2.5	9	4,298	nw.	36	nw.	18	7	16	7	5.9	
Lexington	989	75	122	28.95	29.98	.00	72.0	+ 1.7	93	15	82	50	1	64	27	65	59	65	4.77	+ 0.5	12	6,815	sw.	48	sw.	18	9	12	9	5.4	
Louisville	525	114	136	29.44	29.99	.00	74.2	+ 0.2	96	30	85	51	8	64	27	65	60	72	3.50	— 0.8	12	5,348	n.	44	nw.	23	17	13	0	3.4	
Indianapolis	823	154	164	29.12	29.98	— .01	70.0	— 1.3	91	15	81	50	8	62	28	62	56	61	3.70	— 1.0	11	6,422	sw.	44	nw.	18	12	15	3	4.2	
Cincinnati	628	152	157	29.33	29.99	— .00	71.8	— 0.7	94	15	81	46	9	59	34	62	58	68	1.87	— 2.5	10	4,939	w.	33	n.	13	10	14	6	5.0	
Columbus	824	87	100	29.12	29.97	— .01	69.8	0.0	96	15	81	46	9	59	37	62	57	70	2.45	— 1.1	8	4,442	w.	30	w.	7	7	19	4	5.0	
Pittsburg	842	116	126	29.10	29.98	— .01	67.9	— 2.6	88	30	77	42	2	59	40	63	59	71	2.97	— 0.5	11	3,933	nw.	30	sw.	29	5	11	14	6.6	
Parkersburg	638	77	84	29.33	30.00	— .02	70.4	— 1.4	92	16	81	45	2	59	40	63	59	71	6.77	+ 2.6	14	3,533	s.	30	w.						
Lower Lake Region.							63.5	— 2.4											2.73	— 0.2												
Buffalo	768	178	206	29.14	29.96	.00	61.6	— 1.7	77	24	68	44	21	55	26	54	49	71	1.95	— 1.6	8	8,234	sw.	47	w.	3	8	16	6	5.6	
Oswego	335	76	87	29.57	29.93	— .03	59.6	— 3.2	85	24	67	42	1	52	26	54	49	71	3.56	+ 0.2	11	6,322	w.	33	w.	24	9	10	11	5.1	
Rochester	523	81	90	29.39	29.95	— .01	62.6	— 2.5	86	24	72	41	2	53	30	56	50	64	2.62	— 0.6	11	5,064	sw.	33	sw.	3	11	11	8	5.2	
Erie	714	92	102	29.22	29.98	+ .02	62.3	— 3.6	81	23	69	42	2	57	34	58	53	68	3.01	— 0.9	11	5,120	sw.	28	sw.	3	10	12	8	5.7	
Cleveland	762	190	201	29.17	29.97	— .01	64.5	— 1.8	87	22	72	43	2	58	36	59	54	68	1.05	— 2.8	8	8,011	n.	34	nw.	19	6	11	3	6.3	
Sandusky	629	62	74	29.31	29.97	— .01	66.6	— 2.3	90	15	75	44	9	56	34	59	55	69	2.04	— 1.9	10	5,334	e.	30	sw.	3	8	16	6	5.3	
Toledo	674	122	127	29.26	29.96	.00	66.0	— 2.5	92	15	76	44	9	56	35	57	52	67	4.07	+ 0.6	11	6,015	w.	30	sw.	3	16	10	4	4.2	
Detroit	730	160	166	29.20	29.97	+ .01	64.6	— 2.0	89	29	73	41	9	56	36	57	52	67	3.52	— 0.2	8	5,834	sw.	29	sw.						
Upper Lake Region.							59.3	— 2.1											3.44	— 0.3												
Alpena	609	61	65	29.29	29.94	.00	57.4	— 1.6	79	22	66	37	9	49	29	52	48	74	1.62	— 2.1	13	5,717	se.	26	e.	2	9	15	6	5.4	
Grand Haven	628	55	64	29.28	29.95	.00	62.0	— 0.6	84	14	71	37	1	53	30	56	51	71	2.61	— 1.3	10	6,013	sw.	25	ne.	18	9	13	8	5.4	
Marquette	734	67	95	29.13	29.92	— .02	54.6	— 3.0	81	14	63	31	5	46	30	50	46	74	3.64	+ 0.1	16	5,143	n.	34	s.	10	5	12	13	6.4	
Port Huron	639	70	108	29.30	29.99	— .03	61.6	— 1.5	87	29	71	40	21	52	32	56	52	74	2.70	— 0.8	10	6,251	n.	36	sw.	6	13	12	5	4.3	
Sault Ste. Marie	694	58	65	29.27	29.94	— .02	53.8	— 6.0	81	15	64	32	7	44	27	58	54	72	2.57	— 0.5	13	5,754	nw.	35	nw.	20	13	10	7	4.7	
Chicago	834	241	274	29.10	29.97	— .02	65.1	— 0.1	90	15	72	40	5	54	31	56	51	72	3.60	— 0.2	14	10,844	ne.	55	s.	2	10	15	5	5.3	
Milwaukee	671	106	149	29.25	29.96	.00	62.8	+ 1.9	92	14	72	34	1	53	34	56	51	72	3.21	— 0.9	12	5,931	e.	36	w.	23	6	8	16	6.6	
Greenbay	617	49	57	29.29	29.95	.00	62.6	— 1.7	87	12	63	33	6	46	38	49	45	75	7.56	+ 4.3	11	5,006	se.	36	w.	22	9	14	7	5.5	
Duluth	702	95	106	29.16	29.92	.00	54.2	— 3.6	87	12	63	33	6	46	38	49	45	75	3.48	— 1.1	13	6,365	ne.	38	ne.	2	5	16	9	6.1	
North Dakota.							62.6	— 1.7											4.52	+ 0.7												
Moorhead	925	54	60	28.88	29.87	.00	62.0	— 1.8	96	13	73	32	*	51	38	57	53	74	7.42	+ 3.1	12	7,092	se.	44	se.	27	11	10	9	5.4	
Bismarck	1,674	16	29	28.13	29.87	+ .01	62.8	— 1.8	95	13	74	33	7	52	33	56	50	67	3.44	— 0.1	12	6,731	se.	41	se.	16	11	12	7	5.1	
Williston	1,875	15	31	27.89	29.83	— .01	63.1	— 1.4	101	13	75	32	6	51	45	54	46	60	2.71	— 0.8	9	6,480	n.	40	s.	18	17	10	3	4.3	
Upper Miss. Valley.							70.0	— 0.3											5.15	+ 0.5												
Minneapolis	.....	99	.....	.....	29.00	29.89	— .03	64.9	— 4.1	96	13	75	36	6	55	33	57	52	70	9.00	+ 5.2	13	.....	nw.	.....	.....	.....	5	10	15	.....	
St. Paul	837	114	124	.....	.....	.....	64.2	— 3.1	94	17	74	37	1	57	32	.....	.....	.....	8.18	+ 3.8	14	4,864	se.	40	nw.	16	6	11	13	6.7	
La Crosse	.....	70	78	.....	.....	.....	66.7	— 0.9	94	17	77	33	4	57	32	62	58	66	4.75	+ 0.3	12	4,513	s.	30	ne.	18	12	10	8	5.2	
Davenport	599	71	79	29.38	29.91	— .04	70.4	+ 0.9	98	17	80	44	1	61	31	63	59	70	1.37	— 3.0	6	5,194	sw.	30	e.	15	12	10	8	5.0	
Des Moines	867	84	88	29.01	29.92	.00	70.0	— 0.3	94	17	80	41	1	61	31	63	59	70	3.15	— 2.2	11	5,671	sw.	40	sw.	23	15	6	9	4.5	
Dubuque	698	49	56	29.18	29.91	— .03	68.2	— 0.4	99	17	78	40	7	58	32	60	55	66	2.36	— 2.8	14	4,765	se.	30	nw.	2	5	16	9	6.1	
Keokuk	614	64	78	29.29	29.92	— .02	72.9	+ 2.1	98	17	82	46	4	64	36	64	60	69	5.42	— 0.9	14	5,494	sw.	32	w.	19	8	15	7	4.9	
Cairo	359	87	93	29.60	29.98	+ .01	75.4	+ 0.9	94	17	85	56	*	66	36	68	65	72	6.87	+ 2.4	10	4,856	sw.	46	nw.	19	3	22	5	5.5	

TABLE I.—*Climatological data for Weather Bureau Stations, June, 1897*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometers above ground.	Pressure, in inches: Mean actual, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Up. Miss. Val.—Con																															
Springfield, Ill.	644	82	92	29.28	29.95	− .02	71.8	+ 1.0	95	17	81	46	4	62	26	64	59	69	4.11	− 0.3	14	6,473	w.	31	w.	24	7	13	10	5.8	
Hannibal	534	75	107	.....	.....	.....	73.4	.....	97	*	83	45	4	64	25	....	....	....	6.08	+ 1.3	10	6,524	sw.	34	sw.	24	9	14	7	4.6	
St. Louis	567	111	210	29.38	29.98	+ .02	75.2	+ 0.9	96	17	84	51	4	66	25	67	63	70	5.32	+ 0.2	13	6,260	s.	38	w.	25	9	10	11	5.8	
Missouri Valley.							70.9	− 0.3											4.20	− 0.2											
Columbia	.....	4	84	.....	.....	.....	73.4	− 1.5	96	17	84	42	4	62	30	....	....	....	6.59	+ 2.0	15	4,960	se.	59	nw.	24	5	14	11	6.8	
Kansas City	963	78	95	28.93	29.92	− .02	75.1	+ 1.6	97	18	84	48	4	66	32	67	63	71	7.09	+ 2.1	12	6,114	sw.	29	nw.	24	1	19	10	6.3	
Springfield, Mo.	1,324	100	103	28.59	29.95	− .01	72.9	− 0.2	91	22	81	46	4	64	23	67	64	75	5.36	+ 1.1	15	6,754	se.	42	nw.	25	2	25	3	5.2	
Topeka	.....	81	....	.....	.....	.....	75.2	+ 2.5	100	9	86	45	4	65	32	....	....	....	7.82	+ 2.3	17	.....	se.	....	.....	...	3	24	3	....	
Lincoln	1,199	74	84	28.62	29.86	.....	72.0	+ 0.9	101	16	83	44	4	61	36	64	59	66	2.17	− 2.1	11	7,753	ne.	55	sw.	17	3	25	2	5.0	
Omaha	1,103	92	97	28.73	29.87	− .06	72.2	+ 0.9	98	16	82	47	4	62	32	63	58	66	1.43	− 4.2	11	6,223	se.	29	se.	1	6	17	7	5.9	
Sioux City	1,139	96	109	.....	.....	.....	68.4	− 2.4	94	22	80	42	1	57	34	....	....	....	2.13	− 1.3	15	8,685	se.	72	s.	18	10	8	12	5.9	
Pierre	1,460	50	61	28.32	29.84	− .02	67.2	− 1.1	98	12	79	39	7	56	36	58	51	61	3.11	− 0.3	14	6,802	se.	48	n.	24	9	11	10	5.7	
Huron	1,310	63	72	28.50	29.87	− .03	64.7	− 1.6	92	12	77	32	6	53	37	58	54	70	3.81	+ 0.3	14	7,753	se.	38	nw.	10	9	14	7	5.6	
Yankton	1,234	51	57	28.58	29.86	− .04	68.0	− 2.0	95	22	79	41	6	57	35	60	55	66	2.49	− 1.8	12	5,984	e.	49	s.	18	9	15	6	4.8	
Northern Slope.							62.4	− 1.2											2.59	− 0.1											
Havre	2,494	15	33	27.24	29.80	− .06	61.4	− 0.9	90	15	73	36	4	50	35	53	46	63	6.39	+ 3.4	12	6,952	ne.	48	sw.	16	9	16	5	5.2	
Miles City	2,372	41	49	27.36	29.79	− .06	67.0	0.0	101	14	79	42	4	55	40	55	46	55	1.23	− 1.8	10	5,000	w.	32	w.	5	4	19	7	5.6	
Helena	4,108	88	98	25.79	29.92	+ .02	58.8	− 2.0	89	12	68	37	10	49	35	49	40	57	3.66	+ 1.2	16	5,528	sw.	50	sw.	16	9	9	12	5.5	
Rapid City	3,251	53	61	26.55	29.84	− .04	63.2	− 0.1	90	*	74	40	*	52	37	54	45	58	2.67	− 1.2	14	5,480	se.	42	nw.	23	8	10	12	6.2	
Cheyenne	6,105	58	60	24.01	29.85	− .01	59.8	− 1.5	86	22	72	36	3	48	35	49	39	55	1.60	+ 0.1	11	7,023	nw.	48	nw.	9	13	11	6	4.9	
Lander	5,372	28	36	24.61	29.87	+ .01	60.2	− 1.6	88	13	74	35	4	46	38	48	35	48	0.85	− 0.4	5	4,180	sw.	40	sw.	17	11	12	7	5.1	
North Platte	2,826	43	52	27.01	29.88	− .01	66.6	− 2.0	94	22	78	43	4	55	35	60	56	72	1.72	− 1.7	12	7,031	se.	32	n.	28	4	21	5	5.5	
Middle Slope.							73.4	+ 0.4											3.00	− 0.2											
Denver	5,290	83	151	24.71	29.88	+ .04	65.2	− 1.4	90	15	78	40	3	52	40	52	43	54	2.16	+ 0.8	10	5,681	s.	60	se.	20	5	17	8	5.6	
Pueblo	4,713	74	81	25.22	29.84	+ .01	68.7	− 2.1	96	20	84	44	3	53	44	53	39	48	2.13	+ 0.8	7	5,316	nw.	40	nw.	1	10	13	7	4.4	
Concordia	1,398	42	47	28.40	29.84	− .07	74.2	+ 1.9	102	21	86	45	3	63	33	65	61	67	6.82	+ 2.4	16	5,774	s.	40	nw.	21	2	21	7	6.4	
Dodge City	2,504	44	52	27.30	29.82	− .04	74.0	+ 1.4	98	22	86	48	4	62	35	64	59	67	2.31	− 1.0	9	9,457	s.	67	s.	17	15	15	0	3.9	
Wichita	1,351	78	85	28.48	29.86	− .02	76.9	+ 3.4	102	24	88	44	4	66	32	67	62	67	1.99	− 3.3	11	6,641	s.	28	n.	25	9	17	4	4.8	
Oklahoma	1,218	54	53	28.65	29.90	− .02	75.4	− 1.0	94	21	84	48	4	67	27	69	66	77	2.58	− 0.6	8	9,028	s.	40	s.	1	18	10	2	3.6	
Southern Slope.							72.4	+ 0.2											3.11	− 0.2											
Abilene	1,749	47	54	28.13	29.91	− .01	78.5	+ 0.4	101	23	89	51	4	68	31	67	62	62	3.90	+ 0.6	3	8,717	se.	31	se.	25	14	10	6	4.0	
Amarillo	3,691	53	61	26.22	29.87	− .03	72.4	0.0	102	24	85	46	4	60	37	60	51	58	2.32	− 0.9	11	11,889	s.	66	w.	18	9	10	11	5.4	
Southern Plateau.							77.6	− 1.1											0.69	+ 0.3											
El Paso	3,767	10	110	26.11	29.79	− .03	80.4	− 1.5	102	24	93	58	13	68	35	58	37	30	2.17	+ 1.8	5	7,897	nw.	42	se.	11	19	7	4	2.8	
Santa Fe	6,998	47	50	23.30	29.87	− .02	64.2	− 1.1	84	24	76	40	4	52	31	48	27	34	0.57	− 0.4	8	5,245	se.	40	sw.	24	18	11	1	3.6	
Phœnix	1,076	47	57	28.62	29.72	.....	82.6	− 0.1	107	21	99	54	16	67	40	57	35	22	0.00	− 0.1	0	3,281	e.	19	w.	15	27	3	0	1.2	
Yuma	139	16	50	29.60	29.74	− .04	83.0	− 1.8	106	5	98	56	16	67	38	62	46	36	0.00	0.0	0	.....	sw.	33	nw.	15	27	3	0	0.8	
Middle Plateau.							62.1	− 1.5											0.36	− 0.3											
Carson City	4,720	82	92	25.22	29.91	....	59.4	− 0.7	87	7	73	34	16	46	41	46	33	44	0.12	− 0.3	5	5,932	w.	40	sw.	14	14	13	3	3.6	
Winnemucca	4,340	59	70	25.60	29.89	+ .01	61.0	− 1.8	89	7	75	35	2	47	39	48	30	37	0.44	− 0.3	5	6,083	sw.	36	w.	13	9	10	11	5.5	
Salt Lake City	4,344	83	90	25.57	29.86	− .02	66.0	− 2.1	92	13	78	42	2	54	33	53	41	44	0.52	− 0.3	6	4,663	se.	31	w.	13	11	9	10	6.0	
Northern Plateau.							60.2	− 0.5											1.93	+ 0.5											
Baker City	3,470	49	47	26.38	29.93	− .01	57.4	+ 0.9	84	12	68	35	10	46	41	48	38	55	1.93	+ 0.4	10	3,996	nw.	26	s.	25	3	12	15	6.8	
Idaho Falls	4,742	10	56	25.19	29.90	+ .02	59.7	+ 0.1	89	13	75	31	2	44	45	46	32	43	0.77	− 0.4	5	8,553	s.	40	sw.	17	16	9	5	3.7	T.
Spokane	1,943	99	107	27.87	29.89	− .03	61.7	− 1.4	83	7	72	40	10	52	34	53	46	61	3.51	+ 1.8	10	5,044	sw.	36	s.	19	6	14	10	6.4	
Walla Walla	1,018	65	73	28.85	29.92	− .01	64.9	− 1.5	91	6	76	42	10	54	39	55	47	56	1.51	+ 0.1	9	4,573	s.	22	sw.	21	9	18	3	4.7	
N. Pac. Coast Reg.							58.0	+ 0.2											2.51	+ 0.1											
Fort Canby	179	10	34	29.81	30.00	.00	57.1	+ 1.3	71	20	62	47	18	52	18	53	52	86	3.98	+ 1.4	19	7,328	w.	54	s.	10	3	7	20	7.6	
Port Angeles	29	47	61	.....	.....	.....	54.6	+ 0.6	70	20	60	38	10	49	28	...	....	....	1.16	− 0.1	9	5,494	w.	32	sw.	15	4	14	12	6.6	
Pysht	.....	5	....	.....	.....	.....	57.8	.....	76	24	67	39	10	49	27	....	....	....	1.87	− 0.8	14	.....	w.	....	.....	...	5	11	14	....	
Seattle	119	100	108	29.86	29.99	.....	60.2	.....	79	25	68	46	18	52	27	54	49	71	1.67	.....	10	3,456	se.	20	sw.	11	3	11	16	6.8	
Tacoma	213	....	....	.....	.....	.....	59.0	.....	81	25	67	41	9	51	26	...	....	....	1.54	.....	9	4,311	sw.	24	sw.	15	3	11	16	7.4	
Tatoosh Island	86	12	21	29.92	30.02	+ .02	53.7	− 0.2	66	19	58	46	11	50	18	52	50	85	3.37	− 0.7	14	7,031	sw.	48	ne.	19	4	2	24	8.0	
Astoria	.....	39	60	.....	.....	.....	60.1	+ 2.1	75	26	66	49	17	54	23	....	....	....	4.49	+ 1.4	14	.....	w.	....	.....	...	4	10	16	....	
Portland, Oreg	153	203	213	29.83	29.99	− .06	61.2	− 2.1	83	5	69	41	9	53	28	54	49	69	1.35	− 0.5	11	5,140	nw.	26	sw.	10	3	21	6	5.8	
Roseburg	521	56	67	29.44	30.00	− .06	61.4	− 0.6	88	5	71	42	9	52	38	54	49	71	1.38	+ 0.1	13	2,846	nw.	26	sw.	21	5	10	15	6.8	
Mid. Pac. C'st Reg.							62.6	+ 0.3											0.71	+ 0.2											
Eureka	64	60	69	29.99	30.05	+ .01	55.8	+ 0.8	69	11	61	43	10	51	19	52	51	87	1.60	+ 0.3	10	4,851	nw.	34	nw.	8	3	22	5	5.5	
Redbluff	334	54	58	29.53	29.88	− .01	74.0	− 0.3	104	6	86	49	15	62	35	58	45	44	1.25	+ 0.8	7	5,014	n.	30	nw.	14	18	9	3	3.1	
Sacramento	71	106	117	.....	.....	.. ..	69.8	+ 0.8	99	30	83	50	15	57	39	....	....	....	0.04	− 0.1	1	6,391	sw.	28	sw.	13	19	9	2	2.9	
San Francisco	153	161	167	29.80	29.96	.00	58.9	− 0.9	83	4	66	48	18	52	31	54	51	82	0.22	0.0	3	9,789	w.	39	w.	10	18	7	5	3.7	
Point Reyes Light	.....	12	....	.....	.....	.....	54.3	+ 1.1	74	29	60	46	*	49	25	....	....	....	0.42	0.0	4	.....	nw.	....	.....	...	15	6	9	....	
S. Pac. Coast Reg.							67.8	+ 1.3											T.	− 0.1											
Fresno	332	67	70	29.50	29.84	− .04	74.3	− 1.0	105	30	89	50	15	60	36	57	43	41	T.	− 0.1	0	5,649	nw.	26	nw.	14	26	2	2	1.7	
Los Angeles	330	74	76	29.56	29.91	− .03	65.7	− 1.4	88	4	76	50	20	55	35	58	55	77	T.	− 0.1	0	3,365	sw.	20	sw.	15	10	20	0	3.9	
San Diego	69	59	70	29.82	29.92	− .03	63.4	− 1.6	70	11	67	54	16	60	15	58	56	79	T.	− 0.1	0	4,355	sw.	20	nw.	20	17	11	2	3.9	
San Luis Obispo	301	10	46	29.74	29.96	.....	62.8	.....	96	5	76	44	*	49	45	54	49	70	T.	.....	0	3,899	w.	18	w.	16	19	9	2	2.8	

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more directions, dates, or years. † Received too late to be considered in departures, etc.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, June, 1897.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco†	102	60	82.6	0.96	
Ashville †	103	51	80.2	0.96	
Bermuda†	102	58	82.6	0.44	
Birmingham	101	56	82.0	3.63	
Brewton†	103	58	81.7	0.25	
Bridgeport†	.....	.....	.....	0.63	
Citronelle†	99	67	82.7	2.14	
Clanton †	100	55	80.8	0.37	
Cordova†	.....	.....	.....	1.17	
Daphne†	101	64	83.4	1.97	
Decatur†	104	51	78.6	1.37	
Demopolis	100	57[c]	81.8[c]	1.43	
Elba†	102	53	82.2	2.48	
Eufaula *a* †	100	52	82.4	2.42	
Evergreen †	96	60	79.6	3.30	
Florence *a* †	.....	.....	.....	0.66	
Florence *b* †	100	52	79.2	0.60	
Fort Deposit †	100	60	83.3	1.14	
Gadsden	103	51	80.4	2.59	
Goodwater†	102	53	81.2	3.18	
Greensboro†	99	59	81.0	2.23	
Hamilton	105	48	79.4	2.82	
Healing Springs†	100	56	79.8	2.50	
Highland Home †	98	63	81.9	1.57	
Livingston	103	56	82.5	0.94	
Lock No. 4	103	52	79.6	0.43	
Madison Station†	100	48	77.4	2.19	
Maple Grove	101	44	76.8	1.35	
Marion†	101	61	83.3	1.80	
Mount Willing†	102	57	82.4	1.38	
Newbern†	98	65	82.7	3.00	
Newburg	101[d]	50[d]	78.1[d]	4.42	
Newton†	100	60	82.0	0.95	
Opelika †	100	59	83.2	0.70	
Oxanna †	98	49	78.4	1.38	
Pineapple	105	58	83.4	1.09	
Pushmataha †	100	58	82.4	2.26	
Riverton †	.....	.....	.....	2.07	
Rockmills†	96	55	78.0	3.56	
Scottsboro †	103	55	79.3	1.13	
Selma †	102	60	82.9	2.31	
Talladega *[1]	95	60	83.4	1.65	
Thomasville	102	60	83.5	1.67	
Tuscaloosa†	101	59	83.4	0.89	
Tuscumbia	99	52	79.4	0.81	
Union†	103	54	81.4	2.14	
Union Springs†	103	62	84.2	3.31	
Uniontown†	101	62	83.6	1.59	
Valleyhead	97	45	77.4	2.65	
Wetumpka	102	57	83.2	0.86	
Wilsonville †	.....	.....	.....	1.95	
Alaska.					
Killisnoo	63	37	50.8	1.50	
Arizona.					
Arizona Canal Co. Dam.	109	54	83.0	0.00	
Benson *[3]	102	73	82.0	0.00	
Bisbee†	96	57	76.3	0.18	
Buckeye†	106	48	79.8	0.00	
Calabasas	101	46	75.0	0.08	
Casa Grande *[3]	108	73	89.4	0.00	
Cedar Springs	.....	.....	.....	0.75	
Congress	99	52	77.0	0.04	
Dragoon Summit *[3]	100	70	84.2	0.00	
Farleys Camp†	107	58	83.2	0.00	
Flagstaff †	88	46	66.2	0.01	
Fort Apache	94	38	67.4	0.37	
Fort Defiance	.....	.....	.....	T.	
Fort Grant †	98	55	75.8	0.09	
Fort Huachuca †	98	50	75.0	0.00	
Fort Mohave	113	57	85.8	0.00	
Gilabend *a* *[3]	110	70	90.4	0.00	
Glendale	107	48	79.8	0.00	
Holbrook†	95	36	67.0	0.08	
Lochiel *[1]	96[1]	57[c]	75.2[c]	0.13	
Maricopa *[3]	110	70	90.1	0.00	
Mesa †	109	56	82.6	T.	
Mount Huachuca	100	54	76.9	T.	
Music Mountain	105	43	78.6	0.05	
Natural Bridge	.....	.....	.....	0.40	
Oracle†	99	55	77.1	0.07	
Oro	.....	.....	.....	0.24	
Oro Blanco	102	53	77.3	0.30	
Pantano *[3]	100	73	83.3	0.06	
Parker °	111	51	84.0	0.00	
Payson	.....	.....	.....	0.12	
Peoria †	108	56	82.8	0.00	
Phœnix	106	47	80.2	0.00	
Pinal Ranch	.....	.....	.....	T.	
Reymert †	114	57	84.3	0.54	
St. Helena Ranch	.....	.....	.....	0.32	
San Carlos †	109	46	79.5	0.08	
San Simon *[3]	96	69	80.1	0.00	
Showlow	.....	.....	.....	0.30	
Signal †	108	54	82.0	T.	
Texas Hill *[3]	112	75	91.4	0.00	
Tombstone	100	59	77.7	T.	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Tuba	98	38	69.0	T.	
Tucson *c* †	105	50	80.1	0.00	
Walnut Grove	.....	.....	.....	0.01	
Walnut Ranch *† [1]	95	60	72.7	0.83	
Whipple Barracks †	92	32	65.3	0.56	
Willcox *[3]	100	63	83.4	0.05	
Williams	88	31	62.0	0.00	
Arkansas.					
Amity	97	53	75.6	4.65	
Arkansas City †	.....	.....	.....	0.60	
Beebranch† [1]	102	49	77.2	2.55	
Blackton	.....	.....	.....	1.50	
Blanchard Springs †	99	55	79.2	3.18	
Brinkley	101	51	78.4	1.70	
Camden *a* †	.....	.....	.....	2.54	
Camden *b* †	102	53	78.6	2.67	
Canton *[1]	100	54	75.9	.....	
Conway [b]	105	60	80.2	2.13	
Corning †	100	51	77.3	4.57	
Dallas	98	52	78.5	6.90	
Dardanelle	.....	.....	.....	4.71	
Elon †	100	55	79.8	2.85	
Fayetteville †	95	47	75.3	3.61	
Forrest	99	52	78.7	3.37	
Fulton †	.....	.....	.....	2.13	
Helena *a* †	.....	.....	.....	2.79	
Helena *b*	99	54	80.4	2.33	
Hot Springs *a*	102	52	79.2	4.43	
Hot Springs *b*	.....	.....	.....	4.18	
Hot Springs (near)	.....	.....	.....	4.50	
Jonesboro	106	41	78.4	1.92	
Keesees Ferry †	104	48	76.3	3.92	
Lacrosse †	99	48	74.7	3.48	
Lonoke *[1]	102	56	80.1	2.44	
Luna Landing *[3]	98	56	79.3	1.34	
Lutherville *[1]	103	55	80.0	.....	
Malvern †	103	53	79.0	3.24	
Marianna *[1]	101	63	81.9	.....	
Marvell	100	54	80.8	2.38	
Mossville	92	45	75.0	5.04	
Mount Nebo †	89	50	73.8	6.12	
New Gascony *[1]	97	62	81.5	1.85	
Newport *a* †	.....	.....	.....	3.27	
Newport *b* †	95	52	75.2	3.15	
Newport *c* †	97	52	77.4	3.18	
Oregon *[1]	92	50	70.4	.....	
Osceola †	96	56	78.6	2.84	
Ozark †	101	55	79.5	6.42	
Picayune †	98	60	79.8	3.52	
Pinebluff †	103	54	81.6	1.42	
Pocahontas †	95	46	77.6	4.13	
Prescott	102	56	80.8	3.22	
Rison	103	54	79.9	2.24	
Russellville	102	53	78.5	6.44	
Silver Springs †	93	41	72.9	3.99	
Stamps	102	56	81.8	4.11	
Stuttgart †	98	53	78.4	2.59	
Texarkana †	104	57	81.5	3.36	
Warren †	106	53	80.6	1.49	
Washington *† [1]	99	60	79.4	4.14	
Wiggs *[1]	98	55	79.2	4.83	
Winslow	.....	.....	.....	5.25	
Witts Springs †	94	49	73.9	3.04	
California.					
Adin	92	34	59.8	1.83	
Agnew	86	40	65.2	0.00	
Arlington Heights	100	48	69.4	0.00	
Athlone *[3]	101	52	78.4	0.00	
Azusa	.....	.....	.....	T.	
Ballast Point L. H	.....	.....	.....	0.00	
Barstow †	102	51	78.8	0.00	
Berkeley	85	49	62.4	0.30	
Bishop †	92	36	65.6	T.	
Bishop Creek *[3]	95	50	77.2	T.	
Boca *[3]	88	34	55.3	0.40	
Bodie †	79	18	49.5	0.17	1.0
Bowmans Dam *† [1]	82	37	55.4	4.04	
Caliente *[3]	100	58	77.0	0.00	
Calloway Canal *† [5]	102	58	76.4	0.00	
Campbell	95	41	63.0	0.20	
Cape Mendocino L. H	.....	.....	.....	2.27	
Castle Pinckney *[1]	77	50	63.2	0.00	
Cedarville †	88	35	58.2	1.43	
Centerville *[1]	100	57	67.8	0.29	
Chico *[3]	109	58	77.7	0.61	
Chino *† [5]	97	58	70.6	0.00	
Cisco *[3]	75	33	50.8	.....	
Claremont †	95	45	66.5	0.00	
Corning *[3]	108	55	76.1	0.60	
Craftonville	99	48	71.2	0.00	
Crescent City †	74	40	56.1	0.73	
Crescent City L. H	.....	.....	.....	0.83	
Daunt	.....	.....	.....	0.20	
Delano *[3]	102	59	77.9	0.00	
Delta *[3]	100	51	68.1	2.75	
Descanso *[3]	87	32	58.4	0.01	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Drytown	102	43	65.4	0.60	
Dunnigan *[3]	102	56	78.5	0.35	
Durham *[1]	98	50	67.6	0.73	
East Brother L. H	.....	.....	.....	0.40	
Edmanton *[1]	85	34	54.9	2.14	
Elsinore	103	46	73.2	0.00	
Escondido	97	40	68.8	.....	
Fallbrook *[1]	99	52	66.9	0.00	
Folsom City *b* *[1]	106	60	75.7	0.03	
Fort Bragg †	.....	.....	.....	1.04	
Fort Ross	77	45	56.2	2.27	
Georgetown	94	41	64.6	1.00	
Glendora	.....	.....	.....	0.00	
Goshen *[3]	109	56	76.6	0.00	
Grand Island *[3]	104	50	74.6	T.	
Grass Valley	.....	.....	.....	0.81	
Greenville †	92	30	58.3	1.28	
Healdsburg *[1]	94	45	65.8	1.58	
Hollister	95	40	63.6	0.14	
Humboldt L. H	.....	.....	.....	1.44	
Hydesville	80	37	58.4	0.90	
Indio *[3]	106	70	86.9	0.00	
Iowa Hill *[1]	90	43	62.9	1.32	
Jolon	.....	.....	.....	0.08	
Keeler *[3]	104	62	80.3	0.00	
Keene *[3]	95	37	67.6	0.59	
Kennedy Gold Mine	102	43	69.5	1.06	
Kernville	.....	.....	.....	0.00	
King City *[3]	100	48	65.6	0.07	
Kingsburg *[3]	100	65	73.4	0.00	
Kono Tayee	92	44	66.8	0.48	
Lagrange *[3]	110	52	75.8	0.52	
Laporte *† [1]	83	38	55.1	3.94	T.
Lemoore *a* *[3]	104	57	77.4	0.00	
Lime Kiln	107	49	77.8	.....	
Lime Point L. H	.....	.....	.....	0.45	
Lodi	101	47	70.1	0.04	
Los Alamos †	.....	.....	.....	0.00	
Lytton Springs	97	51	69.8	1.63	
McMullin *[1]	108	54	77.9	.....	
Malakoff Mine *[1]	92	47	64.2	1.45	
Mammoth Tank *[3]	110	70	92.6	0.00	
Mare Island L. H	.....	.....	.....	0.16	
Merced *[3]	103	54	76.0	0.08	
Mills College	.....	.....	.....	0.21	
Milton (near) *[1]	100	54	70.5	0.58	
Modesto *[3]	104	58	78.1	T.	
Mohave *[3]	104	54	80.0	0.00	
Mokelumne Hill *[3]	.....	51	68.2	1.02	
Monterey *[3]	72	50	61.5	0.32	
Mount Breckenridge	.....	.....	.....	0.10	
Mount Frazier	.....	.....	.....	0.00	
Mount Glenwood *[1]	104	55	76.0	0.20	
Mutah Flat †	.....	.....	.....	0.00	
Needles	110	64	80.0	0.00	
Nevada City †	91	40	62.4	0.82	
Newcastle *a* †	99	44	69.3	0.09	
Newhall *[3]	100	56	70.4	0.00	
North Ontario	92	48	67.6	0.00	
North San Juan *[1]	96	44	65.2	1.45	
Oakland *a*	92	50	63.9	0.42	
Ogilby *[3]	110	78	93.2	0.00	
Oleta *[1]	94	48	64.9	0.74	
Orangevale †	108	50	75.4	T.	
Orland *[3]	110	57	79.9	0.60	
Palermo †	110	51	74.6	0.89	
Paso Robles *b*	94	52	67.2	0.00	
Piedras Blancas L. H	.....	.....	.....	0.64	
Pigeon Point L. H	.....	.....	.....	0.38	
Pilot Creek	.....	.....	.....	2.41	
Placerville	99	41	65.8	1.09	
Point Ano Nuevo L. H	.....	.....	.....	0.19	
Point Arena L. H	.....	.....	.....	0.96	
Point Bonita L. H	.....	.....	.....	0.84	
Point Conception L. H	.....	.....	.....	0.00	
Point Fermin L. H	.....	.....	.....	0.00	
Point George L. H	.....	.....	.....	0.24	
Point Hueneme L. H	.....	.....	.....	0.00	
Point Loma L. H	.....	.....	.....	0.00	
Point Montara L. H	.....	.....	.....	1.62	
Point Pinos L. H	.....	.....	.....	0.31	
Point Reyes L. H	.....	.....	.....	0.42	
Point Sur L. H	.....	.....	.....	0.22	
Pomona (near)	100	45	69.7	0.00	
Poway *[3]	90	50	63.6	0.00	
Quincy †	90	37	59.6	1.60	
Ravenna *[3]	100	53	71.3	0.00	
Redding *b* †	100	49	72.5	1.59	
Represa	99	50	71.3	T.	
Riovista	103	50	72.2	0.05	
Roe Island L. H	.....	.....	.....	0.00	
Roseville (near) [k]	108	52	70.3	T.	
Rosewood	104	43	71.1	1.77	
Sacramento *a*	101	50	71.1	0.06	
Salinas *[3]	90	52	67.6	0.30	
Salton *[3]	118	84	98.6	0.00	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
San Bernardino†	97	43	68.9	0.00	
San Jose*b*	92	40	63.2	T.	
San Leandro*†1	90	57	64.8	0.22	
San Luis L. H.	.....	.....	.....	0.00	
San Mateo*†4	92	58	68.4	0.05	
San Miguel*†5	99	51	69.1	0.00	
San Miguel Island	81	48	59.8	0.00	
Santa Ana*†5	92	60	74.6	0.00	
Santa Barbara *a*	81	50	63.0	0.00	
Santa Barbara L. H.	.....	.....	.....	0.00	
Santa Clara *a*	.....	.....	.....	0.00	
Santa Cruz*b*†	85	41	61.2	0.10	
Santa Cruz L. H.	.....	.....	.....	0.24	
Santa Maria	90	50	65.4	0.00	
Santa Monica*†5	80	61	70.4	0.00	
Santa Rosa*†5	96	46	69.3	0.83	
Saticoy	.....	.....	.....	0.00	
Shasta	.....	.....	.....	2.23	
Sierra Madre	94	49	67.0	0.06	
Sneddens Ranch*†1	80	26	50.7	0.00	
S. E. Farallone L. H.	.....	.....	.....	0.32	
Stanford University	97	45	64.6	0.05	
Stockton *a*	97	50	71.7	T.	
Summerdale†	84	31	57.0	0.63	
Susanville†	92	34	63.4	0.42	
Sutter Creek*†5	96	40	63.6	0.66	
Tehama*†5	106	56	76.6	0.86	
Templeton*†5	104	51	58.1	0.00	
Trinidad L. H.	.....	.....	.....	1.50	
Truckee*†5	84	38	58.5	0.18	
Tulare *b*	.....	.....	.....	0.00	
Turlock*b*†	110	44	72.2	0.09	
Ukiah†	96	44	64.5	1.70	
Upper Lake	99	42	65.0	0.97	
Upper Mattole*1	88	47	59.9	1.48	
Vacaville*a*1	104	56	72.6	0.09	
Ventura†	79	41	59.6	0.00	
Volcano Springs*†5	118	66	92.6	0.00	
West Palmdale	.....	.....	.....	0.00	
Westpoint†	.....	.....	.....	1.11	
Wheatland†	107	48	72.5	0.24	
Williams*†5	104	57	77.0	0.31	
Wilmington*†5	82	54	72.2	0.00	
Wire Bridge*†5	99	55	74.4	0.28	
Yerba Buena L. H.	.....	.....	.....	0.08	
Yreka†	96	36	61.4	1.51	
Yuba City*†5	100	46	70.0	0.07	
Colorado.					
Alma†	71	19	44.6	1.39	T.
Antlers†	93	36	65.2	0.78	
Arkins	.....	.....	.....	2.30	
Boulder	85	41	64.6	3.71	
Boxelder	.....	.....	.....	1.59	
Breckenridge†	77	19	46.4	1.53	10.1
Canyon†	102	40	70.1	1.59	
Castlerock	89	32	65.8	3.12	
Cheyenne Wells	98	43	69.0	2.17	
Colorado Springs†	89	36	62.1	0.80	
Crook	99	41	67.5	2.24	
Delta	101	36	69.2	0.76	
Dumont†	82	30	56.8	1.71	
Durango	87	34	62.0	0.40	
Fort Collins†	90	35	62.9	1.69	
Fort Morgan	95[4]	41[4]	67.8[4]	3.28	
Fox	.....	.....	.....	2.64	
Garnett	84	28	56.0	0.24	
Gleneyrie†	84	33	60.0	1.89	
Gold Hill*†1	88	33	58.1	5.53	T.
Grand Junction†	95	43	72.1	0.40	
Greeley†	91	39	64.8	2.47	
Grover	.....	.....	.....	0.89	
Gulch†	93	27	58.8	0.70	
Hoehne	94	39	66.5	0.95	
Holly	.....	.....	.....	0.77	
Hugo (near)	88	34	62.4	1.68	
Husted†	96	34	61.5	1.70	
La Jara	82	36	58.6	.....	
Lake Moraine†	72	25	49.4	2.75	5.0
Lamar†	103	45	73.8	2.87	
Laporte	.....	.....	.....	1.80	
Las Animas†	99	46	71.6	1.26	
Lay†	90	28	59.4	0.73	T.
Leadville (near)*†1	73	26	48.2	1.43	6.0
Leroy†	97	37	65.4	2.24	
Longmont†	97	38	67.0	2.26	
Longs Peak	74	26	49.6	1.50	1.0
Meeker†	95	26	60.5	1.17	
Millbrook†	84	23	56.2	2.37	
Minneapolis†	104	45	73.4	0.79	
Montrose†	94	34	65.2	0.43	
Moraine†	78	29	53.5	1.79	T.
Pagoda†	90	26	57.0	1.55	T.
Paonia†	.....	.....	.....	0.99	
Parachute†	90	36	65.0	1.05	
Pinkbamton*1	83	33	59.2	2.62	2.0
Rangely†	98	32	65.4	0.28	
Colorado—Cont'd.					
Redcliff	.....	.....	.....	1.40	
Rico†	83	24	52.2	0.98	
Ruby	.....	.....	.....	4.55	6.0
Saguache†	80	33	59.0	1.70	
St. Cloud	.....	.....	.....	1.51	
San Luis†	87	29	58.4	0.68	
Santa Clara*1	84	36	58.7	1.85	
Seibert†	.....	.....	.....	2.34	1.1
Sherwood Ranch	83	23	51.7	.....	
Smoky Hill Mine	81	28	55.2	3.80	T.
Springfield	.....	.....	.....	2.34	
Stamford*1	72	26	47.8	2.21	4.2
Steamboat Springs	91	25	57.8	0.85	2.0
Sulphur Springs†	87	26	54.5	2.45	1.0
Surface Creek†	94	30	63.6	1.01	
Thon†	95	32	65.4	3.15	T.
T. S. Ranch†	88	35	65.0	0.28	
Twin Lakes	.....	.....	.....	0.97	
Vilas	.....	.....	.....	0.83	
Walden	82	21	53.2	0.89	1.5
Wallet†	.....	.....	.....	3.47	
Wray†	98	38	69.0	4.79	
Yuma	.....	.....	.....	4.44	
Connecticut.					
Bridgeport	88	43	64.6	3.41	
Canton†	84	36	60.7	4.92	
Colchester	85	40	62.3	2.64	
Hartford *b*	.....	.....	.....	3.83	
Middletown	88	42	64.5	3.52	
New London†	85	44	62.0	2.48	
Norwalk	87	42	64.2	2.67	
Southington*1	84	48	63.8	4.55	
Storrs	83	41	60.8	2.79	
Voluntown†	85[c]	39[c]	63.0[c]	3.66	
Waterbury	86	41	63.8	3.77	
West Cornwall†	80	39	60.0	5.15	
Windsor	83	42	62.6	4.53	
Delaware.					
Milford	95	49	70.8	3.27	
Millsboro	90	40	69.1	2.45	
Newark	93	42	67.0	1.17	
Seaford†	90	44	68.6	4.84	
District of Columbia.					
Distributing Reservoir*b*	89	54	71.7	2.09	
Receiving Reservoir*b*	90	52	70.8	3.21	
West Washington	96	43	69.8	2.66	
Florida.					
Amelia†	96	69	81.2	3.00	
Archer†	98	64	81.8	4.17	
Bartow	97	65	82.0	7.47	
Boca Raton†	91	70	80.6	2.25	
Brooksville†	96	61	81.2	8.32	
Carrabelle†	96	71	82.9	3.60	
Clermont†	101	68	83.6	4.05	
De Funiak Springs	102	66	82.0	7.00	
Earnestville†	99	66	82.8	6.47	
Emerson†	99	58	81.4	4.06	
Eustis†	96	67	82.6	6.33	
Federal Point†	97	66	80.9	4.44	
Fort Meade†	94	65	79.6	6.02	
Frostproof†	99	66	82.4	4.89	
Gainesville	102	69	84.9	4.41	
Grasmere†	99	67	83.6	3.72	
Haywood	.....	.....	.....	3.50	
Huntington	100	65	83.2	7.06	
Kissimmee	.....	65	.....	5.44	
Lake Butler†	99	.....	.....	6.67	
Lake City†	101	71	85.2	7.42	
Lemon City†	93	72	81.8	5.30	
Macclenny†	104	61	84.0	7.53	
Merritts Island	94	70	81.9	6.84	
Milton*1	98	70	82.1	2.34	
Mullet Key†	93	74	84.3	2.60	
Myerst	93	68	80.6	5.80	
New Smyrna	99	66	79.5	3.81	
Oakhill*1	94	73	82.1	.....	
Ocala*†1	95	72	81.2	5.72	
Orange City	100	68	84.8	7.19	
Orange Park	99	67	82.7	3.33	
Orlando†	95	65	79.4	6.53	
Oxford*†1	100	73	83.0	2.62	
Plant City†	98	66	81.6	5.18	
Quincy	.....	.....	.....	4.01	
St. Francis†	98	62	80.0	4.77	
St. Francis Barracks	96	69	81.0	5.45	
Switzerland[c]	98	70	81.5	.....	
Tallahassee†	97	65	82.4	2.64	
Tarpon Springs†	91	66	80.2	3.16	
Georgia.					
Adairsville†	99	50	78.5	0.91	
Alapaha	102	64	83.7	3.99	
Albany†	103	65	84.8	3.71	
Allentown†	104	62	84.5	1.97	
Americus†	102	63	83.6	4.61	
Athens†	98	56	79.2	2.85	
Bainbridge†	103	65	85.0	1.31	
Georgia—Cont'd.					
Belleville	103[d]	67[d]	84.6[d]	6.77	
Blakely†	98	64	83.8	4.31	
Brag	101	64	81.2	7.47	
Camak†	101	61	81.4	3.60	
Canton†	.....	.....	.....	2.40	
Cartersville[d]	98	52	78.7	1.80	
Cedartown	98	56	79.3	3.14	
Clayton†	95	51	74.8	5.35	
Columbus	103	61	82.6	2.33	
Covington	102	55	79.1	2.68	
Crescent	100	67	83.9	3.10	
Dahlonega†	94	47	74.5	2.05	
Diamond	97	49	73.5	5.48	
Eastman†	100	62	81.8	2.93	
Elberton†	98	59	80.0	5.66	
Fleming†	100	61	81.0	5.76	
Fort Gaines	102	65	83.3	2.87	
Franklin	97	57	79.4	2.13	
Gainesville	94	50	76.2	3.03	
Gillsville†	99	53	79.4	2.48	
Greenbush	98	49	76.2	1.57	
Griffin†	103	60	81.0	3.65	
Hephzibah*†6	96	68	80.3	3.30	
Jesup	100	60	82.4	8.16	
Lagrange†	99	58	81.4	2.27	
Leverett	104	59	82.0	2.52	
Lumpkin	99	66	83.8	3.86	
Macon†*b*	102	62	81.4	6.16	
Marietta	96	53	77.3	2.63	
Marshallville†	97	65	83.0	5.87	
Milledgeville†	100	63	82.2	1.27	
Millen	103	64	83.2	3.84	
Morgan†	102[d]	62[d]	82.6[d]	1.50	
Newnan†	103	58	80.7	4.61	
Point Peter	99	54	79.2	3.91	
Poulan†	104	60	82.8	2.82	
Quitman†	104	60	84.8	5.79	
Ramsey	96	47	77.4	2.94	
Rome†	98	51	77.2	3.34	
Sparta	102	61	81.2	1.96	
Talbotton†	96[b]	55[b]	78.5[b]	4.13	
Tallapoosa	100	56	79.4	1.24	
Thomasville†	102	68	84.0	2.87	
Toccoa†	99	60	80.6	1.24	
Union Point	96	58	78.4	4.05	
Washington†	103	53	81.4	2.54	
Waycross	101	65	82.8	4.04	
Waynesboro	98	62	79.8	3.48	
Westpoint	101	60	82.1	1.76	
Idaho.					
Blackfoot†	98	34	63.5	0.62	
Boise Barracks†	101	38	64.5	0.40	
Burnside†	85	29	57.6	1.41	
Cœur d'Alene	82	36	60.0	.....	
Corral*†1	83	36	58.3	0.12	
Downey	91	34	58.3	0.11	
Fort Sherman†	86	34	61.2	3.26	
Gimlet†	86	26	57.5	1.14	
Idaho City	88	26	58.4	0.39	
Junction†	87	26	54.8	1.53	
Kootenai†	91	35	62.9	3.19	
Lake†	80	28	50.6	1.35	6.0
Lewiston *a*†	94	38	66.3	1.82	
Lost River†	.....	.....	.....	1.07	
Martin†	81	24	51.6	.....	
Marysville	86[b]	29[b]	54.1[b]	1.64	
Minidoka	96	27	60.9	0.10	
Murray†	83	30	58.0	3.96	
Nampa	96	34	63.7	0.49	
Ola†	93	36	61.6	1.63	
Paris	90	28	56.7	0.65	
Payette†	99	40	67.6	1.01	
Pollock†	95	39	64.5	1.57	
Rexburg	87	33	59.2	0.63	
Roseberry†	78	27	52.3	2.30	
St. Maries	84	35	61.0	3.28	
Salubria	92	36	62.8	1.23	
Soldier†	89	21	56.2	0.24	T.
Swan Valley†	87	25	56.0	1.40	0.2
Warren†	87	25	53.2	3.20	
Yellowjacket	.....	.....	.....	1.86	
Illinois.					
Albion†	96	50	74.2	4.34	
Alexander†	98	43	73.3	4.52	
Ashton*†1	97	48	70.2	3.07	
Atwood *a**†2	100	42	67.4	8.17	
Aurora *a*	106	40	70.5	5.25	
Aurora *b*	97	40	67.9	5.30	
Beardstown†	.....	.....	.....	3.75	
Bloomington†	99	44	72.2	3.49	
Bushnell†	101	38	74.1	2.82	
Cambridge	95	44	69.8	1.44	
Carlinville†	98	47	74.2	3.91	
Carlyle	.....	.....	.....	3.50	
Carrollton	93	46	72.2	4.89	
Charleston	92	50	71.8	6.60	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Chemung	95	34	65.0	6.35	
Chester	.....	.....	.....	9.60	
Cisne†	94	48	72.4	4.47	
Clearcreek†	102	40	69.8	7.35	
Coatsburg†	96	42	71.8	4.31	
Cobden†	96	47	74.0	4.67	
Cordova	.....	.....	.....	2.30	
Danville	97	42	70.8	4.58	
Decatur†	97	45	72.0	4.32	
Dixon†	98	40	68.5	5.27	
Dwight†	100	43	70.9	5.25	
East Peoria†	98	43	73.2	1.93	
Effingham†	95	49	72.4	5.19	
Evanston*[10]	88	44	63.7	.....	
Fort Sheridan†	93	39	63.5	4.41	
Friendgrove*†[4]	.....	54	73.0	5.52	
Galva†	97	40	69.9	0.92	
Glenwood*†[1]	98[e]	50[f]	66.7[e]	3.82	
Golconda†	100	47	75.8	3.58	
Grafton†	.....	.....	.....	4.99	
Greenville†	100	49	75.4	3.37	
Griggsville†	99	45	73.8	5.45	
Halliday*[5]	97[d]	59[d]	79.8[d]	4.28	
Havana†	97	44	73.4	3.58	
Herrin*[1]	94	42	73.2	5.45	
Hillsboro†	97	48	73.6	3.93	
Iron†[c]	95	43	74.0	6.12	
Joliet†	100	40	69.3	5.19	
Jordans Grove†	94	47	73.4	4.88	
Kankakee *a*†	91	45	70.4	3.32	
Kishwaukee	96	36	67.2	6.35	
Knoxville *a*	.....	.....	.....	2.38	
Lagrange†	93	38	66.0	3.74	
Laharpe*[1]	97	40	73.5	5.80	
Lanark*†[1]	97	34	66.2	5.58	
Lexington	97	43	70.9	1.59	
Loami†	.....	.....	.....	4.31	
Louisville†	94	47	72.2	4.28	
McLeansboro†	95	49	74.0	5.52	
Martinsville†	91	40	70.7	6.77	
Martinton†	97	43	70.3	4.44	
Mascoutah*[5]	96	46	74.2	4.83	
Mattoon*[1]	87[e]	50[e]	70.2[e]	5.11	
Minonk†	102	42	70.8	2.57	
Monmouth†	98	38	71.0	2.00	
Morgan Park	90	39	68.7	5.34	
Morrisonville†	93	47	71.6	4.99	
Mount Carmel†	.....	.....	.....	3.15	
Mount Pulaski	93	43	70.0	4.17	
Mount Vernon	96	46	73.4	[illegible]	
New Burnside†	99	48	75.4	4.1[illegible]	
Olney *a*[1]	99	46	73.2	4.4[illegible]	
Oregon†	98	38	68.2	4.1[illegible]	
Oswego*[1]	94	46	67.6	5.19	
Ottawa†	98	41	70.4	6.90	
Palestine†	97	47	72.8	3.61	
Paris	95	43	70.5	5.60	
Peoria *a*†	.....	.....	.....	1.54	
Peoria *b*†	99	44	72.8	2.11	
Philo†	93	44	69.9	6.22	
Plumhill†	98	48	74.6	4.51	
Rantoul†	95	44	69.9	6.73	
Reynolds	97	40	70.2	1.67	
Riley†	94	36	66.0	3.23	
Robinson*†[3]	95	54	70.2	3.69	
Rockford†	94	36	66.5	4.09	
Roundgrove†	101	41	69.1	5.27	
St. Charles*†[1]	94	45	68.2	2.69	
St. John*†[1]	98	56	75.5	4.52	
Scales Mound	96	34	67.0	6.41	
Streator†	96	43	71.4	6.70	
Sycamore†	96	38	66.6	6.04	
Tiskilwa*†[3]	98	45	68.8	3.37	
Tuscola†	96	44	71.0	4.05	
Walnut†	.....	41	.....	4.95	
Warsaw†	.....	.....	.....	3.93	
Wheaton*[3]	.....	48	66.7	4.22	
Winnebago†	94	36	67.4	4.70	
Zion†	93	35	65.9	4.22	
Indiana.					
Anderson†	92	40	68.8	2.35	
Angola*[1]	94	45	67.5	3.53	
Auburn	90[d]	39	65.8	3.08	
Bloomington†	97	46	71.6	6.27	
Bluffton†	96	41	69.6	5.60	
Bright†	91	46	70.7	3.57	
Butlerville†	94	41	70.3	4.68	
Cambridge City†	92	38	68.2	3.53	
Columbia City*[1]	94	42	68.3	3.03	
Columbus†	92	41	69.0	4.26	
Connersville†	93	41	69.0	3.25	
Delphi†	96	39	69.7	4.85	
Edwardsville*†[1]	94	51	73.8	4.40	
Evansville†	97	48	74.9	4.95	
Farmland†	91	40	67.8	3.55	
Fort Wayne	93	39	68.3	4.49	
Greencastle†	88	46	69.1	5.38	
Hammond†	93	36	67.0	.....	
Huntington	95	40	68.9	4.87	
Jasper†	95	46	72.7	3.70	
Jeffersonville	95	49	73.2	3.39	
Knightstown†	94	42	70.5	2.95	
Knox	96	40	70.6	4.30	
Kokomo†	98	42	70.8	6.76	
Lafayette†	93	44	69.5	5.16	
Laporte	99	36	64.7	2.51	
Logansport *b*†	95	40	70.3	3.29	
Madison†	94	46	72.7	2.30	
Marengo†	95	45	72.5	2.97	
Marion†	95	37	68.8	5.42	
Mauzy†	91	38	68.9	3.46	
Mount Vernon†	96	46	74.6	3.82	
Northfield†	91	40	67.8	5.11	
Princeton*[1]	98	49	73.3	.....	
Richmond	94	39	68.8	5.42	
Rockville†	90	45	69.0	5.30	
Rushville†	.....	.....	.....	3.25	
Salem	95	42	70.8	4.04	
Scottsburg	96[c]	46	73.2	5.02	
South Bend†	95	37	68.2	1.65	
Syracuse†	.....	.....	.....	3.58	
Terre Haute†	97	49	72.1	4.83	
Tipton†	98	41	70.5	2.65	
Topeka†	89	39	66.0	3.31	
Valparaiso†	92	38	65.8	3.95	
Vevay	95	57	76.2	4.45	
Vincennes†	98	50	73.8	3.48	
Warsaw†	95	40	67.0	4.11	
Washington†	96	44	72.0	3.37	
Winamac	.....	.....	.....	5.94	
Worthington†	92	45	71.4	5.83	
Indian Territory.					
Healdton†	97	53	78.1	3.85	
Kemp†	101	53	79.4	3.34	
Lehigh†	98	50	76.5	4.59	
Purcell	.....	.....	.....	7.77	
South McAlester	98	49	79.6	6.50	
Tahlequah	.....	.....	.....	3.45	
Tulsa†	.....	.....	.....	2.20	
Wagoner	102	47	78.7	4.07	
Iowa.					
Adair	.....	.....	.....	4.45	
Afton	95	42	71.4	4.57	
Algona*[1]	97	43	68.4	3.75	
Alta *a*†	92	38	67.4	1.86	
Amana†	97	39	69.4	2.27	
Ames *b*	95	39	68.8	2.16	
Ames (near)	.....	.....	.....	1.54	
Atlantic†	99	35	69.8	3.76	
Atlantic (near)	94	42	70.0	3.04	
Audubon	94	36	67.0	2.78	
Belknap	96	43	71.2	5.10	
Belleplaine	95	35	67.2	3.51	
Bonaparte†	101	40	72.4	6.43	
Britt	94	35	66.4	3.02	
Carroll	94	38	67.8	3.60	
Cedarfalls	98	40	68.8	4.85	
Cedar Rapids†	98	39	68.6	3.96	
Centerville	98	37	72.6	3.20	
Chariton	93	43	70.8	4.25	
Clarinda†	95	44	72.9	4.04	
Clinton	100	39	70.8	3.68	
College Springs	98	40	72.1	2.69	
Corning†	94	38	70.6	4.53	
Council Bluffs	98	42	72.4	1.47	
Cresco†	92	31	64.8	6.95	
Decorah†	95	29	66.2	7.38	
Delaware*[3]	97	46	67.2	3.13	
Denison†	89	40	66.8	2.96	
Dows	94	37	66.0	4.70	
Eldora	98	36	69.0	4.40	
Elkader†	101	31	66.8	3.95	
Estherville	99	37	65.5	5.06	
Fairfield†	99	39	70.4	5.88	
Fayette†	99	34	66.8	6.80	
Fonda	99	39	71.0	1.66	
Forest City	94	37	65.0	3.82	
Fort Madison*†[1]	95	49	73.4	4.28	
Fredericksburg	.....	.....	.....	4.47	
Galva†	98	36	68.8	2.17	
Gardengrove	101	36	71.4	4.95	
Gladbrook	.....	.....	.....	3.23	
Glenwood†	97	37	70.4	1.71	
Grand Meadow*[1]	90	36	64.3	7.51	
Greene	101	36	67.6	3.03	
Grundy Center	94	38	66.6	4.26	
Guthrie Center	95	38	69.3	3.25	
Hampton	94	39	66.2	4.56	
Hawkeye	.....	.....	.....	6.30	
Hopeville†	92	42	69.8	4.09	
Humboldt†	98	37	68.6	2.86	
Independence†	94	37	64.8	5.03	
Indianola†	94	41	69.0	5.23	
Iowa City *a*†	97	38	69.0	2.38	
Iowa City *b*	92	34	67.6	.....	
Iowa Falls†	96	37	67.7	2.68	
Keosauqua	99	43	72.6	9.38	
Knoxville	96	43	71.3	3.57	
Lansing	99	29	67.6	6.53	
Larchwood	..	.....	.....	4.58	
Larrabee†	95	34	66.6	4.26	
Leclaire	.....	.....	.....	1.47	
Lemars	93	36	68.4	3.11	
Lenox*[1]	90	49	70.7	4.53	
Logan†	96	36	69.6	2.97	
Malvern*[1]	101	42	73.7	2.07	
Maple Valley	.....	.....	.....	2.14	
Maquoketa	98	38	69.3	2.54	
Marshall†	96	39	66.6	3.76	
Millman	.....	.....	.....	2.73	
Mooar	97	42	71.2	5.31	
Mountayr†	99	40	72.0	6.17	
Mount Pleasant*[1]	94	50	72.6	7.10	
Mount Vernon *a*[1]	98	45	70.6	2.17	
Mount Vernon *b*	99	38	68.6	2.95	
Neola	102	37	72.1	3.15	
New Hampton	98	42	65.8	4.88	
Newton†	98	41	70.0	2.85	
North McGregor	.....	.....	.....	4.68	
Northwood	93	32	65.2	5.05	
Odebolt	.....	.....	.....	2.40	
Ogden	95	38	68.8	1.91	
Osage*†[3]	.....	43	65.0	5.51	
Osceola	93	43	70.6	4.74	
Oskaloosa†	100	40	70.8	5.06	
Ottumwa	98	36	71.5	5.81	
Ovid†	94	40	70.8	4.50	
Plover	97	36	67.8	1.98	
Primghar	95	37	67.7	1.90	
Red Oak	97	40	74.0	3.95	
Reinbeck	.....	.....	.....	3.82	
Rock Rapids	96	35	66.4	4.98	
Rockwell City	101	41	71.0	.....	
Sac City†	97	39	66.6	2.25	
St. Charles	94	41	70.2	6.78	
Seymour†	99	40	71.6	5.13	
Sibley	95	32	64.8	4.20	
Sidney	94	48	71.6	3.55	
Sigourney	103	40	72.2	2.96	
Spencer	96	34	66.4	3.98	
Spirit Lake†	102	34	66.6	3.51	
Stuart	96	40	69.8	2.39	
Toledo	95	37	68.4	3.11	
Villisca†	94	40	70.9	6.50	
Vinton*[1]	95	44	67.9	3.31	
Washington	99	39	69.6	1.39	
Washta	.....	.....	.....	2.91	
Waterloo	97	38	66.8	4.32	
Waukee	95	34	68.2	2.85	
Waverly	93	39	67.4	2.75	
Webster City	94	41	68.4	2.46	
Westbend*†[1]	95	40	66.2	2.86	
Whitten*[1]	92	41	67.8	2.56	
Wilton Junction†	98	37	70.8	2.17	
Winterset†	94	40	69.2	6.21	
Kansas.					
Abilene†	105	42	77.5	2.32	
Achilles*[3]	101	46	68.2	3.30	
Altoona*†[3]	97	49	74.1	4.72	
Anthony	.....	.....	.....	2.84	
Assaria*[5]	104	44	80.3	0.27	
Atchison†	97	44	74.6	8.50	
Augusta	102	39	76.4	2.42	
Baker	99	49	75.1	4.90	
Beloit†	101	50	77.8	6.48	
Blaine	105	42	75.1	9.29	
Burlington†	99	40	74.8	5.96	
Campbell	100	43	74.2	6.61	
Chanute	95[d]	44[d]	75.8[d]	4.66	
Colby†	99	41[d]	70.2	4.74	
Coolidge†	106	45	74.3	0.58	
Cunningham†	110	40	77.0	1.69	
Dresden*[1]	101	45	68.8	3.99	
Elgin*[1]	97	55	76.4	3.48	
Ellinwood†	102	41	75.4	1.13	
Emporia†	97	45	76.3	3.00	
Englewood†	108	42	75.8	1.79	
Eureka†	.....	.....	.....	5.28	
Eureka Ranch†	103	43	74.5	2.00	
Fall River	97	42	76.2	4.23	
Fort Riley†	100	43	76.0	3.02	
Fort Scott†	97	42	73.8	10.52	
Frankfort	99	44	76.2	5.76	
Garden City†	103	45	74.2	3.19	
Garfield	.....	.....	.....	1.93	
Gibson*[5]	100	42	70.8	2.12	
Girard*[1]	98	49	75.6	6.52	
Gove*†[1]	96	46	69.5	4.49	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grainfield*6	92	48	69.8	4.02	
Grenola	98	39	75.3	2.98	
Halstead	102	40	73.4	2.30	
Hays†	98	45	68.6	3.10	
Horton	98	44	74.6	5.34	
Hutchinson†	103	42	76.0	1.18	
Independence†	103	45	78.6	3.97	
Lakin†	113	.....	.....	1.51	
Lawrence	98	44	74.6	4.86	
Lebo†	100	43	75.0	3.77	
Linn	.....	.....	.....	5.14	
Macksville	99	41	73.4	1.85	
McPherson	104	40	76.0	3.22	
Manhattan *b*	102	44	76.8	4.97	
Manhattan *c*	99	39	75.5	4.54	
Marion†	105	55	81.2	1.90	
Meade†	108	48	78.3	1.75	
Medicine Lodge†	111	40	78.2	2.26	
Minneapolis†	104	41	76.5	2.39	
Morantown†	95	43	74.6	4.34	
Morland	95	40	71.4	3.15	
Mounthope*1	102	52	76.4	2.55	
Ness City	.....	42	.....	1.95	
Newton	100	.....	.....	1.64	
Norton	97	38	69.6	4.33	
Norwich†	105	43	77.5	1.91	
Oberlin†	.....	.....	.....	5.00	
Olathe†	101	39	75.1	6.84	
Osage City†	100	43	76.0	6.75	
Oswego	100	43	77.0	4.21	
Ottawa	98	40	74.3	11.01	
Phillipsburg	102	42	71.6	4.29	
Pleasant Dale	102	41	74.6	1.31	
Pratt	104	44	76.2	1.45	
Rome*†1	101	45	75.0	4.07	
Salina†	108	48	78.4	1.83	
Scott City	102	41	73.8	2.81	
Sedan†	97	42	77.0	3.79	
Seneca	97	42	73.7	4.05	
Sharon Springs*1	105	46	73.0	4.10	
Toronto	98	39	75.9	3.38	
Ulysses†	104[1]	49[1]	75.5[1]	0.25	
Viroqua†	109	47	76.4	0.58	
Wallace*1	106	46	74.6	1.58	
Wamego*1	102	46	75.4	5.68	
Wellington*1	97	50	76.6	2.11	
Winona*5	104	45	71.0	1.08	
Yates Center	97	39	76.0	4.54	
Kentucky.					
Alpha†	94	45	74.0	5.44	
Ashland	96	45	72.8	5.35	
Bardstown†	96	45	73.2	4.93	
Blandville†	94	51	75.1	7.36	
Bowling Green *a**1	97	44	72.7	0.96	
Bowling Green *b*†	98	50	76.8	0.80	
Burnside†	.....	.....	.....	4.08	
Caddo†	94	47	71.3	2.58	
Canton*†1	98	54	75.5	6.12	
Carlisle	93	46	72.0	3.59	
Carrollton†	99	52	76.6	2.98	
Catlettsburg †	.....	.....	.....	4.70	
Earlington	98	46	75.4	2.58	
Edmonton†	92	45	72.8	2.08	
Ensor	95	50	74.5	2.17	
Eubank†,	95	45	71.7	2.20	
Falmouth†	.....	.....	.....	2.70	
Fords Ferry†	100	49	76.2	4.08	
Frankfort†	95	46	73.4	4.12	
Georgetown	98	48	73.2	.....	
Greensburg †	101	45	75.2	3.21	
Henderson †	96	51	75.9	4.39	
Hopkinsville †	97	48	74.8	2.30	
Leitchfield †	96	43	73.1	1.84	
Loretto	96	43	72.0	4.22	
Louisa *a*	99	49	72.1	3.29	
Lyndon	.....	.....	.....	4.44	
Marrowbone†	98	43	73.6	1.47	
Maurice	94	46	72.2	1.65	
Maysville	95	48	70.0	1.48	
Middlesboro†	93	41	71.8	4.76	
Mount Herman	95	50	73.8	1.88	
Mount Sterling†	92	47	72.2	5.03	
Owensboro†	93	49	73.1	2.47	
Owenton†	95[f]	48[f]	74.4[f]	2.95	
Paducah *a*†	.....	.....	.....	5.68	
Paducah *b*†	100	52	77.5	5.98	
Pilot Oak	98	50	76.4	5.07	
Pleasure Ridge Park†	96	45	72.5	5.25	
Princeton	99	46	76.3	3.22	
Richmond†	97	49	72.5	3.65	
Russellville†	98	47	76.4	1.59	
St. John†	92	45	70.5	3.31	
Sandyhook	.....	.....	.....	4.88	
Shelby City	.....	.....	.....	1.51	
Shelbyville†	101	44	73.8	4.03	
Southfork[2]	.....	.....	69.7	3.73	
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Vanceburg	92	43	69.0	2.85	
Williamsburg†	96	47	75.2	4.50	
Louisiana.					
Abbeville	99	61	80.9	1.40	
Alexandria†	102	59	79.8	2.41	
Amite†	105	55	81.7	2.91	
Bastrop †	98	57	80.0	4.77	
Baton Rouge†	99	58	81.0	4.85	
Cameron	.....	.....	.....	2.54	
Cheneyville †	100	57	80.2	4.18	
Clinton †	101	55	81.5	3.64	
Covington	101	56	81.2	3.44	
Donaldsonville †	100	59	81.6	3.44	
Elm Hall	97	58	77.8	1.97	
Emilie†	97	60	80.2	2.25	
Farmerville[k]	98	64	81.9	2.61	
Franklin †	103	61	82.8	1.40	
Grand Coteau	96	62	79.8	6.42	
Hammond	102	55	80.7	2.50	
Houma	100	59	79.6	4.01	
Jeanerette	104	58	82.0	2.69	
Lafayette †	103	59	81.1	2.58	
Lake Charles†	98	64	80.3	7.45	
Lawrence	102	66	83.0	5.63	
Liberty Hill	104	52	81.2	6.08	
Mansfield †	99	52	78.8	3.90	
Melville	98	65	81.4	5.76	
Minden	102	58	81.2	3.11	
Monroe†	101	60	81.8	3.39	
Montgomery	101	57	82.2	6.59	
New Iberia	100[e]	63[e]	81.5[e]	2.45	
Oakridge†	103	56	80.8	4.16	
Oberlin	100	60	79.6	9.55	
Opelousas†	100	51	77.6	4.90	
Oxford†	96	55	78.5	4.17	
Paincourtville †	102	56	81.4	2.51	
Plain Dealing †	99	59	80.4	3.52	
Rayne	101	54	81.4	2.58	
Robeline	100	54	79.0	3.37	
Ruston	97	57	80.8	6.22	
Schriever	102	55	81.8	3.41	
Shellbeach	99	65	83.3	1.99	
Southern University†	95	62	79.0	3.95	
Sugar Ex. Station†	98	64	82.0	8.01	
Sugartown †	99	62	81.0	3.22	
Thibodeaux	.....	.....	.....	2.74	
Venice†	98	67	80.4	2.47	
Wallace	98	62	81.4	6.03	
Whitehall	104[d]	55[d]	81.8[d]	2.30	
White Sulphur Springs	98	61	81.3	4.11	
Maine.					
Bar Harbor	82	35	56.6	4.00	
Belfast*6	74	47	57.3	3.08	
Cornish*1	84	47	58.7	8.68	
Fairfield	87	38	58.2	3.39	
Flagstaff	82	33	55.3	4.27	
Fort Fairfield	87	31	55.6	3.65	
Gardiner	88	42	60.4	4.32	
Kineo†	76	38	56.8	2.59	
Lewiston	90	42	60.4	3.71	
Mayfield	88	34	56.8	3.41	
North Bridgton	87	42	60.1	6.00	
Orono	83	39	57.0	3.71	
Maryland.					
Annapolis	94	55	72.5	1.73	
Bachmans Valley	91	36	65.4	3.71	
Boettcherville[2]	.....	.....	69.2	2.20	
Charlotte Hall †	92	45	69.7	2.69	
Cherryfields†[2]	.....	.....	70.5	2.82	
Chestertown †	90	43	67.8	5.35	
Collegepark	.....	.....	.....	3.49	
Cumberland *b*	92	45	70.8	1.88	
Darlington †	92	42	67.4	1.27	
Easton†	93	40	68.5	3.35	
Fallston*1	90	51	66.7	3.01	
Flintstone	91	32	66.1	2.53	
Frederick	93	39	68.9	2.06	
Grantsville	86	29	63.8	2.72	
Greatfalls*5	90	51	71.0	2.28	
Greenspring Furnace	95	42	68.9	1.85	
Hagerstown †	93	42	70.1	.....	
Jewell†	93	45	68.9	2.29	
Johns Hopkins Hospital	94	44	69.3	3.01	
Laurel	90	45	67.9	2.40	
McDonogh [4]	88	45	70.3	.....	
Mardela Springs†	93	42	69.3	2.79	
Mount St. Marys Coll. †	90	42	67.5	3.52	
New Market	92	48	69.2	2.76	
Pocomoke City	94	46	71.2	1.35	
Port Deposit	93	46	65.8	0.82	
Princess Anne	92	40	67.6	2.62	
Sharpsburg	92	40	67.5	2.40	
Smithsburg	90	45	68.6	2.71	
Solomons†	92	52	71.6	5.69	
Sunnyside	87	29	62.1	6.47	
Taneytown †	97	40	69.8	3.95	
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Van Bibber	93	43	68.3	2.31	
Western Port	96	36	70.3	1.39	
Woodstock	88	40	67.1	3.81	
Massachusetts.					
Amherst	83	36	61.8	6.68	
Bluehill (summit)	83	42	60.0	3.60	
Cambridge *a*	86	43	62.8	5.98	
Chestnut Hill	87	42	62.6	4.53	
Concord†	86	41	60.6	3.88	
Fallriver	84	48	62.5	2.35	
Framingham	87	43	63.6	4.44	
Groton	85	40	60.8	6.30	
Hyannis*†1	84	51	64.6	1.97	
Lawrence	91	44	62.4	5.38	
Leeds	87	41	63.0	6.56	
Lowell *a*	88	44	61.8	6.11	
Middleboro	83	39	60.6	3.26	
Monson	84	41	61.7	3.96	
New Bedford *a*	81	46	60.7	2.48	
Pittsfield	82	41	60.8	5.01	
Springfield Armory	86	39	60.8	6.22	
Taunton *b*	83	42	61.8	3.33	
Wakefield	87	43	62.3	6.50	
Westboro†	87	39	63.6	4.53	
Worcester *b*	82	45	62.4	4.13	
Michigan.					
Adrian	90	42	64.8	3.24	
Allegan	91	32	63.6	1.70	
Alma	93	34	63.0	3.63	
Ann Arbor	93	39	64.8	2.69	
Arbela	90	37	63.6	2.00	
Badaxe†	87	34	61.4	1.73	
Baldwin	96	26	61.0	1.19	
Ball Mountain	89	37	62.8	3.22	
Baraga	86	25	54.3	2.87	
Battlecreek	95	36	66.5	3.60	
Bay City *b*	93	.....	.....	0.64	
Benton Harbor	93	43	65.8	0.84	
Benzonia	89	36	62.6	3.63	T.
Berlin	89	33	60.7	2.14	
Berrien Springs	94	35	65.8	2.41	
Big Rapids	93	31	62.4	1.85	
Birmingham	91	38	65.6	2.73	
Bois Blanc*10	86	38	55.5	.....	
Boon	89	28[e]	59.6	3.80	
Calumet	81	32	55.0	2.53	T.
Camden	91	41	63.9	2.41	
Carsonville	85	34	59.4	1.53	
Charlevoix	77	34	56.0	1.90	
Cheboygan	85	30	57.8	2.08	
Clinton	93	38	65.4	3.92	
Cold Water	94	35	65.0	2.39	
East Tawas	86	36	60.0	1.48	
Eloise	91	37	64.5	2.33	
Escanaba†	84	29	58.3	3.76	T.
Ewen	83	21	55.3	2.80	
Fairview	88	41	62.7	3.19	
Fitchburg	91	35	62.3	2.67	
Flint	89	34	62.2	1.37	
Gladwin	91	33	62.5	2.27	
Grand Rapids *b*	93	37	64.4	1.91	
Grape	91	37	63.7	4.74	
Grayling	93	32	61.7	1.30	
Hanover	92	38	64.0	2.61	
Harrison	91	31	61.8	1.61	
Harrisville	82	32	56.8	1.33	
Hart	94	36	62.0	2.45	
Hastings	90	35	63.3	2.44	
Hayes	87	32	64.2	2.23	
Highland Station	.....	.....	.....	3.82	
Hillsdale	92	37	64.4	1.71	
Holland*10	83	41	63.2	.....	
Howell	90	37	63.5	1.75	
Humboldt	90	12	50.7	2.25	
Ionia	95	29	63.8	1.80	
Iron River	90[j]	23[e]	55.2[d]	3.51	
Ivan	92	32	61.6	2.31	
Jackson	95	39	66.0	4.26	
Jeddo	85	36	60.2	2.54	
Kalamazoo	94	41	66.2	4.59	
Lake City	92	31	61.0	2.53	
Lapeer	92	33	62.5	1.77	
Lathrop	89	24	56.6	3.16	
Ludington	86	33	60.0	1.48	
Luzerne	93	27	60.5	1.66	
Mackinaw City	78	32	55.1	2.40	
Madison	92	40	66.4	2.46	
Mancelona	91	31	59.3	1.95	
Manistee	85	33	58.4	1.95	
Manistique	81	30	55.2	2.33	
Mayville	89	38	63.3	1.68	
Middle Island*10	77	42	55.9	.....	
Midland	92	36	64.2	1.33	
Mottville	95	34	66.1	2.42	
Mount Clemens	92	34	63.9	2.57	
Mount Pleasant *b*	94	35	64.0	1.56	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Muskegon	86	39	62.9	1.74	
Newberry	87	28	54.2	2.57	
North Manitou Island *10	80	35	56.7	.....	
North Marshall [8]	91	37	64.6	3.02	
Northport	83	34	57.7	3.05	
Old Mission	86	33	58.8	1.81	
Olivet	90	40	64.8	5.39	
Omer [9]	90	32	63.0	1.16	
Ovid	89	38	63.6	3.23	
Owosso	93	38	65.0	2.42	
Parkville	.....	.....	.....	1.96	
Petoskey	85[6]	30[6]	55.8[6]	2.60	
Plymouth	93	33	64.5	2.33	
Point Aux Barques *10	78	36	59.0	.....	
Pontiac	89	38	66.9	2.52	
Port Austin	85	39	58.2	2.02	
Powers	89	29	58.7	3.43	
Reed City	90	24	61.5	1.31	
Rockland	88	27	56.4	2.00	
Rogers City	82	30	54.9	2.58	
Saginaw	92	39	65.1	2.16	
St. Ignace	79	33	55.4	2.55	
St. Johns	93	39	65.2	2.78	
Sandbeach *b*	85	30	56.0	0.79	
Sidnaw	90	34	56.4	2.98	
Somerset	89	39	64.2	3.38	
South Haven	88	38	63.4	1.55	
Stanton	90	35	63.7	1.61	
Sturgeon Point *10	75	40	58.0	.....	
Thomaston	92	27	59.2	4.40	
Thornville	90	38	64.6	1.96	
Thunder Bay Island *10	72	36	54.7	.....	
Traverse City	92	34	61.8	2.31	
Valley Center	87	31	61.8	2.64	
Vandalia	93	38	66.7	2.46	
Wasepi	91	35	64.4	1.59	
Waverly	89	31	63.0	2.00	
West Harrisville	83	32	58.6	1.21	
Wetmore	84	26	54.4	3.57	
White Cloud	94	32	62.1	2.99	
Ypsilanti	89	39	63.6	3.06	
Minnesota.					
Ada†	96	27	61.6	5.96	
Albert Lea	96	36	65.2	3.06	
Alexandria†	90	30	60.5	5.50	
Beardsley	95	29	62.1	6.54	
Bermidji	.....	.....	.....	8.70	
Bingham Lake	95	32	65.0	.....	
Bird Island	89	33	63.0	5.43	
Blooming Prairie†	92	35	65.0	5.65	
Bonniwell	96	33	62.9	.....	
Caledonia†	94	31	65.2	5.80	
Camden	94	30	64.0	3.82	
Collegeville	94	34	62.7	4.88	
Crookston†	96	32	61.4	3.93	
Detroit City	94	28	58.6	6.61	
Faribault	92	33	63.6	3.44	
Farmington†	96	26	61.6	6.87	
Fergus Falls†	92	29	62.4	4.86	
Glenwood†	97	28	62.4	5.94	
Grand Meadow†	97	33	64.6	6.78	
Lake City	98	28	65.6	3.51	
Lakeside†	90	33	64.0	9.75	
Lake Winnibigoshish [1]	90*	29	57.9	4.82	
Lambert†	94	26	59.2	3.85	
Lawrence	95	30	64.4	2.84	
Leech Lake [1]	93*	24	58.5	5.98	
Lesueur *1	98	40	65.9	6.55	
Long Prairie†	96	29	60.9	5.75	
Lutsen	78	28	52.4	2.51	
Luverne†	98	35	65.1	4.52	
Maplepiain	94	35	65.2	6.26	
Maplewood *1	89	43	64.4	.....	
Mazeppa [1]	102*	24	64.7	3.70	
Milan†	94	29	63.6	5.74	
Minneapolis *a*†	100	31	64.7	9.40	
Minneapolis *b* [1]	94*	31	63.4	9.22	
Minnesota City *†1	96	32	66.8	5.98	
Montevideo†	92	33	62.8	4.54	
Morris	96	30	63.6	5.12	
Mount Iron	97	25	56.8	3.27	
New London	94	28	57.2	6.18	
New Richland *14	96	42	66.3	.....	
New Ulm†	94	39	65.5	5.49	
Park Rapids†	93	27	57.5	7.49	
Pine River [1]	93*	26	59.6	5.88	
Pleasant Mounds†	92	34	64.3	4.15	
Pokegama Falls [1]	93*	21	57.3	5.01	
Redwing	.....	.....	.....	4.29	
Reeds	.....	.....	.....	6.15	
Roseau	96*	28*	58.2*	2.04	
St. Charles†	94	28	65.0	5.18	
St. Cloud	90	33	61.2	6.77	
St. Olaf	91	31	61.5	6.58	
Sandy Lake Dam [1]	92*	29	58.2	5.43	
Shakopee [6]	94*	34	64.2	6.46	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Tower†	98	18	54.7	3.00	T.
Two Harbors†	83	33	54.0	4.07	
Wabasha *1	95	40	65.2	4.15	
Willmar†	90	32	62.8	7.88	
Worthington	90	34	64.0	6.76	
Zumbrota [1]	92*	22	64.9	.....	
Mississippi.					
Aberdeen†	108	51	81.4	0.40	
Agricultural College	101	58	81.8	1.93	
Austin†	97	51	79.3	4.94	
Batesville†	99	50	78.4	0.14	
Bay St. Louis	98	66	81.2	1.42	
Biloxi†	98	63	82.5	3.15	
Booneville†	101	53	80.8	0.50	
Briers†	96	64	80.5	2.39	
Brookhaven†	103	55	82.6	2.68	
Canton†	99	59	82.0	3.10	
Columbus *a*†	.....	.....	.....	0.74	
Columbus *b*†	111	54	83.8	0.69	
Corinth†	101	50	79.0	1.83	
Crystal Springs†	103	57	81.6	2.84	
Edwards	101	59	83.0	3.34	
Enterprise	102	56	81.4	1.44	
Fayette†	101	56	81.2	4.51	
Fulton†	98	52	80.6	1.48	
Greenville *a*	97	61	80.8	1.09	
Greenville *b*†	99	56	80.4	1.05	
Hattiesburg†	99	60	84.2	1.94	
Hazlehurst†	102	57	81.6	2.69	
Hernando†	100	55	79.2	1.54	
Holly Springs†	101	56	79.8	1.28	
Jackson†	101	55	81.0	3.59	
Lake†	99	55	80.4	3.80	
Leakesville†	102	59	82.2	2.16	
Logtown†	100	62	81.7	1.98	
Louisville†	101	57	80.4	1.25	
Macon†	104	54	82.9	1.41	
Magnolia†	103	54	81.4	2.56	
Mayersville	96	60	80.4	2.60	
Meridian†	100	56	80.7	2.83	
Mosspoint	99	66	82.8	2.25	
Natchez†	99	58	81.5	2.35	
Okolona†	104	52	82.0	0.37	
Pontotoc	101	53	80.8	1.86	
Port Gibson†	100	56	80.5	2.59	
Rosedale	99	55	80.6	1.22	
Stonington *1	96	66	81.7	.....	
Thornton†	98	60	81.3	3.70	
Topton *1	98	64	84.2	2.35	
Water Valley *†1	101	53	78.0	0.31	
Waynesboro *b*†	102	58	80.4	3.60	
Windham†	102	54	80.3	2.15	
Woodville†	98	57	79.9	5.51	
Yazoo City†	102	58	81.4	3.14	
Missouri.					
Akron	.....	.....	.....	8.27	
Appleton City	98	41	74.6	5.01	
Arlington†	.....	.....	.....	5.20	
Arthur *†3	.....	55	71.9	10.76	
Avalon	98*	45)	73.1[6]	5.58	
Bagnell†	.....	.....	.....	7.16	
Birchtree	92	46	71.8	5.78	
Bolckow†	.....	.....	.....	5.24	
Boonville†	.....	.....	.....	5.35	
Brunswick	95	46	72.8	4.94	
Carrollton†	98	46	74.6	6.36	
Conception	91	48	72.0	11.67	
Cowgill *5	98	48	73.5	7.28	
Darksville†	101	46	74.1	7.85	
Downing	.....	.....	.....	5.82	
East Lynne *3	.....	48	71.2	5.56	
Edgehill *5	96	52	73.1	8.91	
Eightmile *1	91	44	71.2	5.28	
Eldon *1 9	97	50	73.8	.....	
Elmira	101	39	73.6	11.47	
Emma *3	.....	54	72.6	7.75	
Fairport	.....	.....	.....	5.75	
Farmersville	.....	.....	.....	7.34	
Fayette	98	44	74.2	7.28	
Fulton	.....	.....	.....	7.82	
Gallatin *1	97	49	73.2	7.11	
Glasgow	99	44	73.9	4.61	
Gordonville *3	.....	56	70.6	6.48	
Gorin	.....	.....	.....	4.58	
Halfway	96	42	74.3	6.10	
Harrisonville†	100	41	74.0	3.84	
Hastain	102	40	75.4	7.61	
Hermann†	.....	.....	.....	8.26	
Houston	95	50	74.1	5.05	
Houstonia	.....	.....	.....	8.53	
Humansville	99	40	75.8	5.63	
Irena	.....	.....	.....	5.13	
Ironton†	97	43	72.5	10.69	
Jefferson City†	98	47	75.5	5.90	
Kidder	99	42	73.0	6.46	
Lamar†	96	44	75.4	7.88	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lamonte	.....	.....	.....	8.49	
Lebanon	93	45	74.2	5.20	
Lexington†	100	44	75.3	4.02	
Liberty	97	38	74.0	8.70	
McCune *†1	94	55	73.5	7.52	
Mansfield	.....	.....	.....	4.55	
Marblehill	98	45	73.0	7.40	
Marshall†	101	41	74.8	3.79	
Maryville	95	42	71.5	4.11	
Mexico†	100	45	74.4	7.29	
Mineralspring	92	42	72.8	3.25	
Montreal *1	92	51	72.3	3.93	
Mount Vernon	95	44	74.7	5.18	
Neosho	92	41	73.8	5.38	
Nevada *1	97	50	73.8	7.40	
New Haven *1	96	54	76.1	7.62	
New Madrid	102	49	75.6	3.27	
New Palestine *†1	93	59	75.2	6.54	
Oakfield	98	48	75.1	8.96	
Oakmound	.....	.....	.....	3.70	
Oakridge *4	.....	46	70.6	6.09	
Olden†	94	45	73.0	3.85	
Oregon *a*	94	45	73.4	3.68	
Oregon *b* *1	94	44	72.3	2.78	
Osceola†	.....	.....	.....	3.32	
Oto	.....	.....	.....	3.20	
Palmyra *5	96	50	75.2	8.32	
Phillipsburg *†1	96	51	73.7	6.17	
Pickering *3	.....	44	71.6	3.72	
Platte River *3	96	46	72.3	5.60	
Poplar Bluff	98	43°	76.2	8.72	
Potosi	94	38	68.2	9.22	
Princeton	102	44	74.6	6.51	
Rhineland	96	46	73.9	7.63	
Richmond	98	48	74.0	5.28	
Rolla	.....	.....	.....	4.66	
St. Charles	98	48	73.8	6.13	
St. James *3	.....	51	71.6	.....	
St. Joseph†	.....	.....	.....	5.30	
St. Louis	95	49	72.9	5.73	
Sarcoxie *3	92	42	72.2	4.19	
Sedalia	96	44	74.1	4.00	
Seymour *1	96	44	72.0	3.88	
Shelbina	.....	.....	.....	6.70	
Sikeston	96	49	74.8	4.51	
Stellada†	96	39	72.8	6.15	
Sublett	102	40	73.0	3.65	
Unionville†	97	47	73.8	4.54	
Vichy	96	43	73.2	5.60	
Virgil City	.....	.....	.....	7.97	
Warrenton	98	45	73.3	10.40	
Wheatland	.....	.....	.....	4.95	
Willow Springs	94	44	72.0	3.91	
Zeitonia *1	101	45	72.6	6.25	
Montana.					
Augusta†	86	36	60.8	4.77	
Billings†	98	39	63.5	2.61	
Boulder	88	30	57.8	2.38	
Bozeman†	91	36	59.6	3.90	
Bozeman Exper. Stat'n.	92	32	58.7	3.95	
Butte†	85	29	55.4	3.02	T.
Castle	90	27	55.4	2.89	
Chinook†	97	38	65.4	4.23	
Choteau†	88	33	58.2	7.24	
Columbia Falls	92	28	59.6	5.87	
Ekalaka	96	38	62.8	1.00	
Fort Benton	91	39	63.4	4.51	
Fort Custer†	100	39	65.3	3.10	
Fort Keogh†	103	39	67.4	1.09	
Fort Logan†	93	32	58.4	3.98	
Fort Missoula	85	32	60.0	3.88	
Glasgow	102	35	65.0	1.67	
Glendive†	105	41	67.2	1.48	
Greatfalls†	90	38	60.1	5.89	
Hogan†	93	34	58.8	6.03	
Kalispell	87	32	58.6	3.16	
Kipp†	86	27	54.0	7.53	T.
Lewistown	88	31	55.8	3.54	
Livingston†	93	35	60.7	3.30	
Manhattan †	93	33	60.8	2.29	
Martinsdale†	93	33	57.8	3.68	
Marysville†	86	35	55.6	4.49	T.
Monarch	88	24	56.0	5.10	
Radersburg	.....	.....	.....	4.03	
St. Ignatius Mission†	86	33	60.9	4.91	
St. Pauls†	92	30	56.6	0.68	
Troy	87	31	60.0	4.30	
Utica†	91	30	57.4	3.98	
Virginia City†	91	33	57.2	3.22	T.
Wibaux †	.....	.....	.....	1.87	
Yale†	95	27	59.0	2.19	
Nebraska.					
Agee *1	96	42	68.2	3.94	
Albion	98	35	69.0	4.74	
Alliance *1	92	40	67.2	2.01	
Ansley†	96	37	67.1	4.57	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Arapaho *1	96	46	73.5	2.90	
Arborville *1	96	40	70.2	4.22	
Arcadia	101	44	69.6	5.19	
Ashland *a* †	98	41	72.6	2.31	
Ashland *b* *1	100	51	75.8	2.69	
Ashton	98	39	70.3	5.14	
Auburn *† 1	100	44	74.6	2.19	
Aurora *1	94	48	75.5	5.35	
Bassett	92	38	65.8	3.39	
Beatrice †	98	42	72.2	4.29	
Beaver City †	99	41	70.4	3.54	
Benedict				1.71	
Benkelman				3.66	
Bluehill *1	94	47	71.2	7.68	
Brokenbow				4.28	
Burchard				3.37	
Burwell				2.44	
Callaway †	93	47	67.8	4.95	
Camp Clarke	102	41	68.6	1.01	
Central City	97	51	76.2	3.75	
Chester *1	92	50	71.0	10.00	
Columbus †	95	42	69.4	3.15	
Cornlea				5.62	
Creighton †	104	37	70.0	3.73	
Crete	99	43	71.4	2.41	
Culbertson				8.67	
Curtis *a*	100	46	70.6	4.08	
David City *† 1	94	48	70.5	2.00	
Dawson	100	40	74.2	3.42	
Divide				5.77	
Dunning *1	97	47	71.0	3.89	
Eden				3.11	
Edgar *1	95	43	73.5	6.00	
Elba				4.79	
Ericson *† 1	103	45	74.3	3.85	
Ewing †				3.03	
Fairbury †	101	40	69.4	5.82	
Fairmont †	96	41	69.7	4.21	
Filley				3.31	
Fort Robinson	94	38	64.0	1.49	
Franklin	105	38	71.4	5.50	
Fremont †	94	41	70.2	2.68	
Geneva †	99	39	70.9	4.42	
Genoa	97	40	70.1	3.80	
Gering †	100	37	68.4	0.67	
Gothenburg	106	44	69.8	4.45	
Grand Island *a* *1	100	47	74.0	5.12	
Grand Island *b*	93	42	69.4	5.34	
Greeley				7.18	
Haigler				4.56	
Hartington †	95	39	66.6	5.82	
Harvard *1	92	49	71.4	3.74	
Hastings *1	91	46	70.5	6.23	
Hayes Center				4.36	
Hay Springs	94	36	63.4	1.52	
Hebron †	97	42	71.3	5.52	
Hickman				1.68	
Holdrege *b* *1	98	52	73.2	3.45	
Imperial *a* †	102	42	70.1	2.38	
Indianola (near) *1	98	44[c]	69.4[c]	6.31	
Kearney *2	96	50	71.8	3.34	
Kennedy	97	40	66.0	3.80	
Kimball †	93	38	64.6	2.16	
Kirkwood *1	97	42	67.2	4.33	
Lexington †	92	37	67.6	4.61	
Lincoln *b* †	99	43	73.2	2.30	
Lincoln *d*	101	44	73.0	1.43	
Lodgepole †	99	35	66.3	1.42	
Loup *a*				6.41	
Loup *b* *1	98	40	67.7	7.17	
Lynch *† 1	98	44	68.7	3.09	
Lyons	94	40	68.9	4.28	
McCook *1	98	46	72.4	5.63	
McCool				2.92	
Madison *1	93	38	66.9	3.51	
Madrid *5	98	40	71.6	1.52	
Marquette				3.40	
Minden *a* *1	95	48	69.7	4.99	
Minden *b*				5.01	
Monroe				3.59	
Nebraska City *b* *1	94	45	73.4	2.79	
Nemaha *1	104	50	74.7	3.71	
Nesbit	94	40	67.1	3.47	
Norfolk *a* †	92	42	68.8	2.93	
Norfolk *b*	95[k]	54[k]	74.2[k]	3.07	
Norman	96	43	70.7	5.88	
North Loup †	96	39	69.8	7.87	
Oakdale †	95	39	67.8	4.87	
Odell *5	94	52	73.3	4.82	
O'Neill †	93	38	66.8	3.15	
Ord	100	36	68.8	4.90	
Osceola				2.50	
Ough †				2.76	
Palmer *b*				4.84	
Plattsmouth *a* †				2.37	
Ravenna *a*	95	40	68.2	5.82	
Ravenna *b* *1	94	48	70.8	5.05	
Redcloud *a*				10.93	
Redcloud *b* *1	96	50	76.3	12.25	
Republican *1	98	50	77.0	3.56	
Rulo *1	94	52	77.2	3.93	
St. Libory	93	33	69.6	4.94	
St. Paul	95	42	72.0	5.06	
Salem *1	96	48	75.6	1.20	
Santee Agency †	100	38	69.1	2.19	
Sargent				5.13	
Schuyler				3.24	
Seneca *1	96	45	70.0	5.70	
Seward *1	94	48	74.4	1.28	
Springfield *1	98	48	72.6	1.55	
Springview	100	40	68.2	1.90	
Stanton *1	98	46	68.9	4.93	
Stockham				5.20	
Strang *1	98	52	75.8	2.84	
Stratton				3.29	
Stromsburg				3.47	
Superior *b	95	48	72.6	8.39	
Sutton				3.70	
Syracuse				2.18	
Tecumseh *b* †	100	36	72.8	3.89	
Tekamah	96	42	70.2	4.92	
Thedford *1	98	44	68.1	4.00	
Turlington †	98	41	71.6	2.55	
Valentine †	94	40	65.6	1.69	
Valparaiso				2.30	
Wakefield	95	42	68.4	4.37	
Wallace *1	99	40	69.0	1.46	
Wayne				2.10	
Weeping Water *1	98	44	69.5	2.44	
Westpoint †	98	42	70.0	6.08	
Whitman				2.60	
Wilber *1	96	50	74.5	2.47	
Willard				3.65	
Wilsonville *1	100	50	73.9	2.97	
Wisner *b	91[c]	49[c]	71.7[c]	5.23	
Woodlawn				1.69	
York *1	105	41	74.7	1.76	
Nevada.					
Austin	85	32	58.8	0.79	T.
Battle Mountain *1	95	43	61.1	1.22	
Beowawe *1	95	43	63.8	0.75	
Candelaria	93	31	64.2	0.40	3.0
Carlin *1	96	36	62.2	0.19	
Carson City	89	32	58.8	0.12	
Cloverdale *1	88	49	65.5	0.02	
Clover Valley				0.10	
Cranes Ranch				0.88	
Darrough Ranch				0.33	
Downeyville	102	39	69.9	0.35	
Elko *3	95	35	58.8	0.95	
Ely	90	25	57.6	0.15	T.
Empire Ranch	99	34	68.7	0.05	0.5
Fenelon *1	89	32	56.4	0.10	
Genoa	96	38[l]	67.2[l]	0.01	
Golconda *1	94	44	65.9	0.30	
Halleck *1	97	39	63.1	0.99	
Hamilton	87	20	53.4	0.04	0.4
Hawthorne *a* *3	89	48	69.1	T.	
Hawthorne *b*	93	40	66.0	T.	
Hot Springs *1	96	46	69.5	0.43	
Humboldt *1	91	42	63.1	0.57	
Keysers Springs				0.10	
Lewers Ranch	87	31	57.6	0.55	
Los Vegas [c]	97	51	70.9	0.00	
Lovelock *1	94	46	66.8	T.	
McGill	100	30	59.7	0.02	
Midas	82	35	61.1	0.17	T.
Mill City *1	100	45	62.8	0.20	
Monitor Mill	90	29	58.6	T.	T.
Osceola	89	40	62.6	0.03	
Palisade *1	79	54	62.8	0.55	
Palmetto	88	25	58.2	0.58	0.5
Reno *3	98	46	64.9	0.00	
Reno State University	89	33	58.4	0.29	
Ruby Valley				0.39	0.1
St. Thomas	112	49	82.5	T.	
San Antonio	95	37	64.2	T.	
Silver Peak	97	41	69.8	T.	
Tecoma *1	95	42	64.7	0.00	
Toano *1	92	36	63.4	T.	
Tuscarora	83	29	54.2	0.72	T.
Tybo	93	31	63.0	T.	
Verdi *1	90	39	57.2	0.20	
Wadsworth *1	96	48	69.0	0.20	
Wells	94	24	59.4	0.71	
New Hampshire.					
Bethlehem	83	32	58.2	6.97	
Concord	89	34	60.3	8.35	
Durham	87	37	59.6	8.85	
Grafton †	85	34	58.4	4.79	
Hanover	84	40	60.2	5.55	
Keene	86	33	59.8	5.71	
Lancaster	89	34	58.8	6.56	
Nashua	89	41	61.5	5.12	
Newton	86	39	59.7	6.61	
North Conway	88	34	57.8	5.27	
Peterboro	85	35	59.4	7.21	
Plymouth	92	37	60.4	5.49	
Sanbornton †	84	37	58.1	7.89	
Stratford	88	33	60.4	5.80	
West Milan	87	30	56.2	6.97	
New Jersey.					
Asbury Park	92	44	65.8	3.46	
Barnegat	96	47	69.0	4.82	
Bayonne	92	47	67.3	3.72	
Beachhaven	93	50	67.0	2.09	
Belvidere	91	41	65.0	3.23	
Beverly †	93	42	67.6	4.95	
Billingsport *1	89	56	68.4	4.01	
Blairstown	93	44	66.0	3.36	
Boonton	90	40	64.9	2.46	
Bridgeton	94	49	70.8	4.66	
Camden	90	47	66.8	4.43	
Cape May	90	46	67.2	2.23	
Cape May C. H. †	92	44	67.0	2.80	
Charlotteburg	86	35	61.6	3.71	
Chester	83	42	63.4	3.23	
Clayton	92	41	67.4	2.12	
College Farm †	91	41	66.6	2.50	
Deckertown	87	40	63.6	3.08	
Dover	88	42	64.0	3.44	
Egg Harbor City	92	39	66.5	5.32	
Elizabeth †	93	43	67.3	2.71	
Englewood	92	40	65.3	2.51	
Franklin Furnace	85	39	63.6	2.92	
Freehold	88	44	65.6	4.59	
Friesburg				3.29	
Gillette	87	38	63.2	2.35	
Hammonton				4.16	
Hanover	86	38	64.4	2.60	
Hightstown	92	45	67.3	4.62	
Imlaystown	94	44	69.2	4.57	
Junction				2.73	
Lambertville	95	43	67.1	4.80	
Moorestown	91	43	66.8	4.58	
Newark *a*	89	46	66.8	3.28	
Newark *b* †	91	46	67.4	3.92	
New Brunswick *a*	92	42	68.0	2.47	
New Brunswick *b*	89	41	64.4	2.16	
Newton	87	38	63.8	3.59	
Ocean City	93	46	66.9	2.98	
Oceanic	89	50	67.2	2.76	
Paterson	91	43	67.4	2.91	
Perth Amboy	88	43	66.4	3.32	
Plainfield	89	39	65.5	2.79	
Rancocas				4.38	
Rivervale	90	37	62.8	3.83	
Roseland	89	39	64.2	3.13	
Sergeantsville	88	42	65.2	5.50	
Somerville	94	37	66.5	2.80	
South Orange	88	41	65.9	3.30	
Staffordville				2.95	
Toms River	92	37	65.6	4.79	
Trenton	91	48	69.2	4.37	T.
Vineland	95	41	67.6	2.30	
Woodbine	94	36	66.4	2.58	
New Mexico.					
Albert	101	50	73.9	4.27	
Albuquerque †	95	45	72.8	0.99	
Alma	93	39	68.2	0.7	
Angus V. V. Ranch	94	35	64.4	1.81	
Aztec †	92	32	64.4	T.	
Bernalillo †	99	45	72.3	0.63	
Bluewater †	96	28	64.8	0.12	
Buckmans	87	27	57.1	1.11	
Clayton	99	45	70.4	3.29	
Deming *3	104	60	77.8	0.50	
East Lasvegas †	88	39	63.6	1.23	
Eddy	106	46	77.8	0.66	
Engle †	99	45	73.9	1.38	
Espanola †	94	37	66.9	0.08	
Fort Bayard	96	45	70.4	0.60	
Fort Union [k]	90	33	63.4	3.39	
Fort Wingate	89	35	65.2	0.25	
Galisteo †	91	40	69.0	3.61	
Gallinas Spring †	104	44	72.0	0.78	
Gila	103	45	76.2	0.15	
Hillsboro †	99	51	75.9	0.42	
Labelle †	78	27	52.0	1.57	
Las Cruces †	101	43	75.8	0.07	
Lordsburg *3	99	68	81.5	0.00	
Los Lunas †	99	40	71.2	0.25	
Lower Penasco	98	50	71.9	0.65	
Monero †	90	25	58.6	0.32	
Ocate †	89	35	62.4	5.51	
Ollo	95	34	66.5	0.00	
Puerto de Luna †	106	53	75.6	2.02	
Raton †	92	38	62.2	2.12	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rincon†	103	49	76.6	0.39	
Roswell†	104	51	75.0	1.42	
San Marcial†	99	48	74.4	0.85	
Shattucks Ranch	98	40	.6	2.45	
Socorro	101	44	75.6	0.57	
Springer†	98	34	65.6	4.94	
White Oaks†	95	41	68.8	1.84	
Winsors Ranch	85	22	53.6	1.77	
New York.					
Adams				2.05	
Addison	86	35	61.0	2.56	
Akron				1.79	
Alfred	82	34	58.4	2.97	
Angelica†	86	31	59.1	5.56	
Appleton	88	38	61.6	1.65	
Arcade	86	33	59.2	2.64	
Atlanta				2.23	
Avon	93	33	62.1	1.96	
Baldwinsville	90	42	63.4	3.23	
Bedford	86	41	62.6	3.10	
Big Sandy*10	82	40	61.5		
Binghamton†	85	37	61.0	3.76	
Bolivar	85	30	59.0	3.44	
Boyds Corners				3.41	
Brentwood	93	36	64.0	3.50	
Brooklyn	91	49	68.1	2.60	
Canajoharie	90	44	62.8	6.31	
Canton	88	30	60.5	2.50	
Carmel	89	43	65.3	3.23	
Catskill	88	43	63.0	2.84	
Charlotte*10	82	40	57.8		
Chenango Forks				2.90	
Cherry Creek				3.10	
Cooperstown†	85	38	59.5	5.22	
Cortland	86	35	59.8	3.81	
Dryden	87	33	60.6	3.76	
Eagle Mills				5.56	
Elmira	87	40	65.2	1.76	
Fleming	87	41	62 0	3.96	
Fort Niagara†		42		2.15	
Franklinville	84	30	58.9	1.71	
Friendship	84	32	60.3	2.93	
Fulton				3.78	
Garrattsville	83	37	58.0	2.44	
Glens Falls	86	37	62.1	6.21	
Gloversville	84	38	60.1	6.72	
Haskinsville				1.88	
Honeymead Brook	84	36	62.0	4.55	
Humphrey†	82	36	59.4	3.71	
Ithaca	85	39	60.9	3.54	
Jamestown	86	37	61.8	2.06	
Kings Station				6.63	
Lake George	86	37	61.4	4.90	
Little Falls	86	40	59.1	5.45	
Lockport	84	39	61.6	1.53	
Lowville	86	35	58.8	3.40	
Lyndonville				1.74	
Lyons	88	44	62.8	2.95	
Madison Barracks†	85	36	59.4	1.03	
Mohonk Lake	82	46	63.4	2.29	
Mount Morris				2.10	
Newark Valley				3.81	
New Lisbon	84	29	57.2	4.10	
Niagara Falls				1.70	
North Hammond†	88	46	61.6	2.92	
North Lake	82	32	55.5	4.50	
Number Four†	82	29	55.2	4.29	
Ogdensburg	80	42	61.6	1.88	
Oneonta	88	35	61.7	5.31	
Oxford	91	32	60.6	4.80	
Palermo†	89	37	61.0	4.07	
Perry City	87	35	60.0	4.18	
Phoenix				3.28	
Pine City				2.28	
Pittsford	87	40	61.9	3.18	
Plattsburg Barracks†	83	39	61.6	3.90	
Port Jervis	86	42	63 8	3.34	
Potsdam	85	35	60.4	2.70	
Poughkeepsie	89	36	63.0	4.25	
Primrose	90	40	66.0	3.35	
Ridgeway	86	40	62.5	1.79	
Rome	92	36	62.2	4.87	
Romulus	91	41	62.9	2.71	
Rose				4.75	
St. Johnsville	86	39	60.2	3.50	
Saranac Lake	88	30	58.4	3.75	
Scottsville				3.15	
Setauket†	85	48	64.7	2.82	
Sherwood				3.90	
Skaneateles				3.15	
South Canisteo	86	30	58.7	3.48	
Southeast Reservoir				3.18	
South Kortright†	87	32	58.6	5.00	
Straits Corners	86	35	60.2	3.64	
Tyrone				3.04	
Wappingers Falls	89	44	65.8	4.55	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Warwick				3.38	
Watkins	90	38	62.0	2.04	
Waverly†	85	34	62.0	3.22	
Wedgwood	87	38	61.9	2.74	
Westfield	85	38	63.2	1.80	
Westpoint†	90	46	65.6	3.20	
Willetspoint	88	47	65.8	2.67	
North Carolina.					
Abshers	95	48	73.1	6.32	
Asheville†	90	46	70.4	6.09	
Beaufort†	92	62	76.7	4.80	
Biltmore†	92	47	70.6	5.13	
Bryson City†				3.30	
Chapelhill†	100	55	77.0	1.69	
Edenton	95	54	75.7	3.28	
Experimental Farm	96	58	77.0	3.28	
Fairbluff†				4.32	
Fayetteville†	98	58	76.8	2.94	
Flatrock	90	44	70.2	8.84	
Goldsboro†	99	60	78.2	3.73	
Greensboro†	98	55	76.4	2.82	
Henderson†	98	55	75.2	4.11	
Highlands	84	44	66.6	5.91	
Jacksonville	98	57	77.8	5.98	
Lenoir*†	90	58	72.3	5.14	
Linville†	79	40	64.0	6.75	
Littleton†	96	51	74.0	2.15	
Louisburg†	98	55	76.4	2.12	
Lumberton†	98	63	78.8	6.16	
Lynn*†	92		73.4	7.69	
Mana				2.20	
Marion	92	50	72.4	4.58	
Moncure†	96	52	75.6	3.59	
Monroe†	94	55	75.5	4.22	
Mountairy†	92	48	72.6	3.19	
Mount Pleasant	97	57	76.8	4.49	
Murphy†				2.94	
Newbern†	94	65	77.5	2.98	
Oakridge†	96	52	74.5	2.71	
Pantego				4.37	
Pittsboro†	93	55	75.4	4.51	
Rockingham†	100	60	78.4	5.09	
Roxboro†‡	97	52	74.9	3.35	
Salem†	97	51	75.9	2.77	
Salisbury†	98	56	77.2	2.42	
Saxon†	100	49	76.2	3.03	
Selma	98	54	77.0	1.92	
Settle	98	54	76.0	2.70	
Skyuka				6.46	
Sloan†	97	58	76.4	5.74	
Soapstone Mount†	96	49	74.8	3.61	
Southern Pines *a*†	98	56	78.0	4.83	
Southern Pines *b*	99	59	77.9	3.08	
Southport†	95	62	78.2	3.16	
Springhope*‡	95	59	75.2	4.56	
Tarboro	100	50	76.3	2.30	
Waynesville†	90	42	68.8	5.89	
Weldon†	99	51	75.2	1.86	
Willeyton	97	49	73.8	1.42	
North Dakota.					
Amenia‡	93	29	61.0	6.85	
Ashley†	93	24	61.6	4.63	
Bordulac	94	30	58.6	1.34	
Buxton	92	28	60.7	2.90	
Churchs Ferry	100	32	62.8	2.97	
Coalharbor†	96	31	62.4	2.28	
Devils Lake†	97	30	60.8	4.43	
Dunseith				1.41	
Ellendale				5.12	
Falconer	96	28	62.9	2.67	
Fargo†	94	26	61.8	7.10	
Forman†	95	24	60.8	5.56	
Fort Berthold†	99	33	62.4	1.06	
Fort Yates†	97	30	64.0	2.85	
Gallatin†	95	25	61.6	3.25	
Glenullin	99	39[1]	66.6[1]	2.36	
Grafton†	98	29	59.8		
Grand Rapids†	94	25	61.0	6.30	
Hamilton	99	27	60.4	1.78	
Jamestown†	92	34	61.2	7.29	
Langdon†	96	24	57.9	2.45	
Larimore†	96	26	59.4	3.09	
McKinney	100	28	60.4	10.40	
Medora†	105	32	64.6	1.19	
Milton†	95	25	59.9	2.77	
Minnewaukon	97	28	61.1	5.05	
Minot†	101	29	63.0	3.38	
Minto†	102	27	61.6	1.81	
Napoleon†	93	25	61.0	8.96	
New England City	98	38	64.6	1.20	
Oakdale†	95	31	62.2	2.60	
Portal†	109	38	59.9	2.03	
Power†	94	32	64.0	6.20	
St. John†	95	31	59.8	2.49	
Sheyenne	98	26	61.4	3.87	
Steele†	93	26	62.0	4.00	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Towner†	97	27	60.6	1.17	
Valley City†	92	29	58.9	6.32	
Wahpeton†	100	29	64.5	6.95	
Whites Ranch	100	32	65.2	1.36	
Wildrice†‡			62.5	5.74	
Woodbridge†	96	20	58.9	2.44	
Ohio.					
Akron	90	41	66.0	1.55	
Annapolis	94	34	67.2	3.15	
Ashland	87	40	64.8	3.51	
Ashtabula	86	43	62.7	2.65	
Atwater				2.41	
Auburn				1.55	
Bangorville	93	42	67.0	3.76	
Basil				2.93	
Bellefontaine	95	39	68.7	2.08	
Bement				1.96	
Benton Ridge	93	34	67.5	2.90	
Bethany	102	45	72.7	2.33	
Bigprairie	92			2.58	
Binola	92			2.15	
Bissells	89	39	65.1	1.52	
Bladensburg	89	35	65.6	2.25	
Bloomingburg	92	44	69.7	2.19	
Bowling Green	92	38	65.4	2.67	
Bucyrus	94	46	69.2	1.10	
Cambridge	90	38	65.9	3.56	
Camp Dennison	96	46	71.6	2.27	
Canal Dover	92	37	66.8	1.61	
Canfield				4.07	
Canton†	90	40	67.1	2.61	
Carrollton	91	36	65.4	3.78	
Cedarville				3.28	
Cherryfork	99	41	72.8	2.14	
Chillicothe†				2.28	
Circleville	92	45	69.4	1.45	
Clarksville	93	45	69.8	1.26	
Cleveland *a*	87	42	64.4	1.10	
Cleveland *b*	88	42	65.5	0.91	
Clifton	95	40	69.1	4.76	
Coalton	96	40	70.6	3.18	
Colebrook	88	34	65.6	2.53	
Dayton *a*	98	41	71.1	2.20	
Dayton *b*†				1.47	
Defiance	92	39	65.1	5.91	
Delaware	94	41	69.1	2.84	
Demos	88	42	67.7	2.71	
Dupont	93	40	66.2	2.97	
Elyria	91	40	65.3	1.61	
Fairport Harbor*10	82	48	65.6		
Fayetteville	94	46	70.7	1.58	
Findlay	97	38	67.8	2.80	
Frankfort	90	41	67.1	1.95	
Garrettsville†	88	32	63.0	1.59	
Granville	93	41	67.6	3.52	
Gratiot	90	41	67.8	2.66	
Greenfield	95[4]	48[4]	72.0[4]	2.20	
Greenhill	90	33	64.9	3.02	
Greenville	88	42	67.0	3.31	
Hackney				5.36	
Hanging Rock	94	44	72.0	5.37	
Hedges	92	37	67.6	5.11	
Hillhouse	87	31	62.5	1.60	
Hillsboro†	98	39	71.0	1.25	
Hiram	85	38	63.9	1.85	
Hudson	90	35	64.9	2.34	
Jacksonboro	97	45	70.5	1.70	
Kenton†	92	41	68.0	3.94	
Killbuck	92	36	67.0	2.92	
Lancaster	92	42	68.4	1.48	
Leipsic	93	34	66.0	3.80	
Levering	92			3.45	
Logan	96	37	73.6	1.41	
Lordstown	85	36	64.4	2.28	
Lowell	99	40	72.8	5.93	
McArthur	93	41	69.0	4.76	
McConnelsville†	93	41	73.4	4.94	
Mansfield†				2.67	
Marietta *a*†				3.70	
Marietta *b*	93	43	68.9	3.39	
Marion	94	39	68.4	3.50	
Medina	91	38	65.4	2.66	
Milfordton	92	37	62.7	2.59	
Milligan	99	37	69.2	3.11	
Millport	86	33	63.0	2.22	
Montpelier	94	38	65.6	4.04	
Napoleon	98	39	66.6	3.75	
Neapolis				3.45	
New Alexandria	88	41	67.4	5.07	
New Berlin	90	37	66.0	2.37	
New Bremen	92	40	68.5	2.10	
New Comerstown	92	38	67.0	2.32	
New Holland	97	43	70.8	1.13	
New Paris	94	39	70.4	5.29	
New Waterford				4.10	
North Lewisburg	96	41	68.8	3.05	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd	°	°	°	*Ins.*	*Ins.*
North Royalton	89	38	55.4	1.91	
Norwalk	90	38	64.8	2.71	
Ohio State University	93	42	68.0	2.86	
Orangeville	90	33	63.5	3.17	
Ottawa	92	40	67.7	3.63	
Pataskala†	95	41	68.4	2.51	
Perry	.....	.....	.....	0.99	
Philo	95	41	69.8	2.93	
Plattsburg	95	40	68.8	3.23	
Pomeroy	94	43	70.4	6.92	
Portsmouth *a*†	.....	.....	.....	2.66	
Portsmouth *b*	98	49	74.8	2.61	
Richwood	.....	.....	.....	2.40	
Ridgeville Corners	92	33	66.0	2.94	
Ripley	93	49	71.7	2.96	
Rittman	90	35	62.0	2.42	
Rockyridge	96	38	67.0	3.03	
Rosewood	90	41	67.0	2.84	
Shenandoah	92	38	65.0	2.22	
Sidney *b*	96	41	69.0	3.31	
Sinking Spring†	93	45	70.0	2.09	
Springboro	.....	.....	.....	2.80	
Spring Valley	95	41	69.0	1.86	
Strongsville	.....	.....	.....	1.88	
Sylvania	92	35	64.6	3.63	
Thurman	96	44	71.0	4.71	
Tiffin†	91	41	66.8	3.04	
Upper Sandusky	90	40	67.1	1.93	
Urbana	89	41	67.0	2.93	
Vanceburg	94	45	69.8	3.64	
Van Wert	92	40	67.2	3.43	
Vermilion	89	40	67.9	2.02	
Vickery	92	37	66.4	2.28	
Walnut	.....	.....	.....	2.82	
Warren	93	35	64.7	1.91	
Wauseon	93	38	66.5	3.33	
Waverly	99	41	72.4	2.11	
Waynesville	.....	.....	.....	3.28	
Wellington	94	41	67.5	2.36	
Westerville	91	44	67.4	2.97	
Willoughby	.....	.....	.....	1.38	
Wooster *a*	.....	.....	.....	3.23	
Wooster *b*†	88	37	64.4	2.98	
Youngstown	91	34	63.1	2.65	
Oklahoma.					
Alva	109	50	78.2	1.70	
Anadarko†	100	43	78.4	2.60	
Arapaho†	100	45	76.6	2.85	
Beaver	.....	.....	.....	3.66	
Burnett†	94	47	76.2	3.37	
Clifton†	99	45	77.4	2.64	
Fort Reno†	94	46	75.3	2.69	
Fort Sill	99	48	76.1	2.80	
Hennessey	100	47	79.0	1.40	
Jefferson	105	42	77.7	5.15	
Keokuk Falls	.....	.....	.....	4.48	
Kingfisher	100	46	76.9	1.83	
Mangum†	104	42	77.0	3.23	
Norman†	97	46	77.4	5.35	
Ponca	99	50	77.4	2.48	
Prudence†	102	36	77.0	3.81	
Sac and Fox Agency†	97	43	76.0	2.50	
Stillwater†	93	44	75.6	4.13	
Waukomis	104	44	78.2	1.22	
Winnview†	99	43	76.5	2.33	
Woodward	108	45	79.9	1.16	
Oregon.					
Albany *a*	86	41	62.8	2.73	
Arlington	90	42	67.0	0.51	
Ashland *b*	93	36	60.8	2.01	
Aurora [8]	92	52	67.6	2.90	
Aurora (near)	84	34	59.5	1.68	
Bandon	70	46	58.4	0.96	
Bay City†	78	40	58.2	6.83	
Brownsville [8]	92	55	66.3	2.41	
Burns (near) [8]	87	38	58.2	.....	
Canyon City	91	38	60.6	2.11	
Cascade Locks	88	48	63.8	2.75	
Comstock [8]	85	42	55.6	1.96	
Coquille River L. H.	.....	.....	.....	1.55	
Corvallis *a*	87	37	60.6	2.09	
Dayville†	91	34	61.1	1.32	
Eugene *a*†	85	40	60.1	4.14	
Falls City	.....	.....	.....	1.73	
Fife†	83	20	50.8	2.16	
Forest Grove	85	37	60.8	1.79	
Fort Klamath	83	29	53.4	1.65	
Gardiner	75	43	58.2	2.18	
Glenora	87	38	58.8	4.06	
Government Camp	73	27	48.1	5.91	
Grants Pass *a*†	94	38	61.6	2.26	
Happy Valley	86	29	55.0	1.61	
Hood River (near)	85	42	61.1	0.95	
Irvington	.....	.....	.....	1.39	
Jacksonville	92	40	61.6	1.46	
Joseph	83	30	55.2	2.68	
Oregon—Cont'd.					
Junction City [8]	92	42	61.6	1.68	
Lafayette [8]	90	48	62.5	2.23	
Lakeview†	88	28	57.0	2.09	
Langlois	79	43	61.5	3.58	
McMinnville	89	33	61.6	1.55	
Merlin [8]	98	46	66.3	2.12	
Monmouth [8]	93	54	66.2	1.59	
Mount Angel†	93	38	61.6	2.83	
Nehalem	.....	.....	.....	5.50	
Newberg	89	32[c]	60.3[c]	1.97	
Newbridge	93	19	58.4	.....	
Newport	70	41	58.0	1.70	
Pendleton	94	31	63.0	0.57	
Prineville	88	30	58.4	2.53	
Riddles [8]	94	36	60.5	1.05	
Salem *b*†	83	38	60.9	1.77	
Sheridan [8]	88	51	64.9	1.39	
Silver Lake	91	26	54.6	2.65	
Silverton [8]	88	52	64.0	1.87	
Siskiyou [8]	85	40	58.4	4.25	
Sparta	88	32	58.1	2.85	
Springfield [8]	85	50	62.5	2.98	
Stafford	88	34	60.0	2.00	
The Dalles†	90	42	65.9	1.07	
Tillamook Rock L. H.	.....	.....	.....	3.74	
Umatilla	.....	.....	.....	0.80	
Vale	93	38	64.3	1.19	
Vernonia	88	34	61.9	3.52	
West Fork [8]	94	40	60.2	1.69	
Weston	89	35	61.8	1.34	
Williams	91	36	60.4	1.64	
Pennsylvania.					
Altoona	88	40	67.0	2.44	
Aqueduct	96	39	68.7	2.93	
Beaver Dam	.....	.....	.....	5.22	
Bethlehem	.....	.....	.....	4.03	
Blooming Grove	84	33	60.5	3.30	
Brookville†	.....	.....	.....	5.19	
Browers Lock	.....	.....	.....	4.29	
Cameron	.....	.....	.....	2.72	
Canonsburg	90	42	67.9	1.11	
Carlisle	95	39	67.4	1.52	
Cassandra	83	32	62.4	2.88	
Cedarrun	.....	.....	.....	1.18	
Centerhall†	84	39	62.9	4.03	
Chambersburg†	92	36	66.1	1.32	
Coatesville	96	41	67.5	2.92	
Confluence†	90	39	66.0	2.48	
Coopersburg	88	46	65.3	4.33	
Davis Island Dam†	.....	.....	.....	4.00	
Derry Station	89	34	66.3	1.99	
Doylestown	.....	.....	.....	4.99	
Driftwood	.....	.....	.....	2.48	
Dubois	.....	.....	.....	2.48	
Duncannon	.....	.....	.....	3.91	
Dunmore	89	36	62.8	3.32	
Dushore	87	30	61.8	3.09	
Dyberry	85	34	60.1	2.85	
East Bloomsburg	.....	.....	.....	2.79	
East Mauch Chunk	90	40	64.6	2.08	
Easton	88	44	66.2	3.26	
Edinboro [1]	84	38	62.8	.....	
Ellwood Junction†	.....	.....	.....	4.71	
Emporium	88	36	63.1	2.04	
Everett	87	33	64.2	5.00	
Farrandsville	.....	.....	.....	3.10	
Forks of Neshaminy [1]	85	54	67.4	6.42	
Franklin	89	37	63.2	2.90	
Frederick	.....	.....	.....	3.22	
Freeport†	.....	.....	.....	3.46	
Gettysburg	96	40	69.4	.....	
Girardville	.....	.....	.....	4.17	
Grampian	88	36	63.7	3.14	
Greensboro†	95	41	68.4	4.15	
Greenville	93	34	63.2	3.55	
Hallstead†	82[1]	35[b]	60.0[b]	2.80	
Hamburg	93	46	68.2	4.59	
Hollidaysburg	93	31	65.4	1.66	
Huntingdon *a*†	90	39	65.8	4.27	
Huntingdon *b*	.....	.....	.....	4.28	
Irwin	.....	.....	.....	2.87	
Johnstown†	88	37	63.5	3.67	
Karthaus	.....	.....	.....	0.82	
Keating	.....	.....	.....	3.77	
Kennett Square	93	41	66.3	2.78	
Lansdale	.....	.....	.....	4.22	
Lawrenceville	.....	.....	.....	2.55	
Lebanon	96	39	66.4	3.00	
Leroy†	84	39	61.6	3.77	
Lewisburg	92	38	65.5	2.31	
Lock Haven *a*†	94	38	66.9	3.05	
Lock Haven *b*	.....	.....	.....	2.72	
Lock No. 4†	.....	.....	.....	2.72	
Lycippus	89	42	67.2	2.42	
Mifflin	.....	.....	.....	1.58	
Oil City†	.....	.....	.....	4.05	
Pennsylvania—Cont'd.					
Ottsville	.....	.....	.....	5.55	
Parker†	.....	.....	.....	3.69	
Philadelphia *b*	92	48	69.0	4.19	
Point Pleasant	.....	.....	.....	5.04	
Pottstown	93	46	69.4	4.90	
Quakertown	90	39	64.0	3.81	
Reading[2]	.....	.....	67.4	3.03	
Renovo *a*	.....	.....	.....	2.79	
Renovo *b*	88	39	66.4	2.59	
Ridgway†	.....	.....	.....	2.88	
Saegerstown	90	28	61.2	3.58	
St. Marys	85	32	60.9	2.13	
Salem Corners	82	42	62.0	3.59	
Scranton	87	34	63.2	3.43	
Seisholtzville	.....	.....	.....	3.12	
Selinsgrove	92	38	69.2	2.62	
Shawmont	.....	.....	.....	5.59	
Shinglehouse	86	28	59.8	3.49	
Sinnamahoning	.....	.....	.....	1.59	
Skippack	91	39	64.5	4.37	
Smethport	85	30	60.4	2.95	
Smiths Corners	.....	.....	.....	6.00	
Somerset	84	32	62.0	2.56	
South Bethlehem	88	40	66.4	.....	
South Eaton	83	39	62.2	3.92	
State College	87	38	64.1	3.03	
Sunbury	.....	.....	.....	2.05	
Swarthmore	91	47	68.5	4.28	
Swiftwater	81	38	61.2	3.35	
Towanda	87	37	62.6	2.11	
Warren†	87	34	61.6	2.50	
Wellsboro†	85	32	59.8	2.85	
West Chester	91	45	66.8	2.43	
West Newton†	.....	.....	.....	2.60	
White Haven	88	36	60.4	2.32	
Wilkesbarre†	91	39	65.2	3.72	
Williamsport	87	38	64.0	3.89	
York†	93	38	66.8	2.42	
Rhode Island.					
Bristol	83	48	61.8	2.08	
Kingston	83	38	61.6	4.43	
Providence *a*	90	48	65.6	3.31	
South Carolina.					
Allendale†	102	64	82.8	4.86	
Anderson†	.....	.....	.....	3.12	
Batesburg†	98	63	80.3	4.51	
Blackville†	102	62	81.5	5.62	
Camden†	.....	.....	.....	7.03	
Central†	100	52	79.4	.....	
Cheraw *a*†	100	60	79.2	7.01	
Cheraw *b*†	.....	.....	.....	7.32	
Clemson College	100	51	79.0	2.68	
Conway†	.....	.....	.....	5.10	
Darlington (near)	.....	.....	.....	4.50	
Edisto†	.....	.....	.....	9.12	
Effingham†	.....	.....	.....	5.30	
Florence†	99	60	78.2	6.42	
Georgetown†	94	63	79.7	4.80	
Gillisonville†	103	60	82.1	7.76	
Greenville†	95	56	75.4	3.63	
Greenwood	100	62	79.8	3.39	
Holland	101	49	78.3	4.80	
Kingstree *a*†	99	63	80.6	5.98	
Little Mountain	102	61	79.4	7.89	
Longshore†	97	60	78.2	3.89	
Mount Carmel†	.....	.....	.....	1.82	
Pinopolis [1]	94	67	77.8	11.75	
Port Royal†	98	67	82.5	4.85	
St. George†	96	64	79.8	6.61	
St. Matthews†	97	53	78.6	5.16	
St. Stephens†	.....	.....	.....	7.01	
Santuck†	97	58	77.4	4.77	
Shaws Fork [1]	96	67	79.4	5.74	
Smiths Mills†	.....	.....	.....	5.61	
Society Hill†	95	62	77.2	6.86	
Spartanburg	96	58	77.4	6.19	
Statesburg†	97	61	79.3	5.85	
Trenton	96	62	80.6	2.79	
Trial†	97	62	78.2	7.96	
Walhalla	96	57	76.4	3.01	
Winnsboro	95	63	77.2	3.34	
Yemassee†	103	64	82.4	5.57	
Yorkville	96	62	78.2	4.87	
South Dakota.					
Aberdeen†	100	30	66.2	4.40	
Alexandria†	92	36	67.4	4.89	
Armour†	97	37	66.5	4.23	
Ashcroft†	99	35	63.9	1.14	
Brookings	91	29	63.6	3.86	
Canton	94	35	66.2	3.14	
Castlewood†	95	24	63.2	5.60	
Centerville	.....	.....	.....	3.91	
Chamberlain†	94	35	67.0	1.89	
Cross†	85	33	57.4	3.09	
Doland	99	27	65.6	4.00	
Edgemont	.....	.....	.....	0.21	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Farmingdale	.....	.....	.....	2.12	
Flandreau	93	31	63.2	5.18	
Forestburg †	95	36	66.0	3.93	
Forest City	.....	.....	.....	4.64	
Fort Meade †	94	39	63.5	5.32	
Gary	98	35	62.4	4.00	
Goudyville	102	28	64.4	4.71	
Highmore	98	32	66.8	2.79	
Hitchcock	.....	.....	.....	3.24	
Hotch City †	98	35	66.1	1.96	
Hot Springs	89	40	65.0	1.98	
Howard †	91	31	63.8	3.73	
Kimball †	93	37	66.0	2.52	
Leslie †	104	40	69.3	3.44	
Mellette †	100	29	66.2	4.50	
Menno †	99	36	69.2	1.86	
Millbank	94	30	62.6	4.60	
Mitchell †	92	33	64.6	2.26	
Oelrichs †	98	38	67.2	0.70	
Parker †	96	33	66.1	3.64	
Parkston	92	32	65.4	4.93	
Plankinton †	98	30	68.2	1.98	
Rosebud	97	35	64.6	1.47	
Shiloh	95	38	63.4	2.89	
Silver City	.....	.....	.....	2.56	
Sioux Falls †	93	32	65.2	4.80	
Spearfish †	88	40	65.2	4.38	
Tyndall †	98	38	68.4	4.23	
Watertown	91	25	60.2	7.76	
Wentworth †	94	27	64.4	4.35	
Wessington Springs	92	32	64.9	2.96	
Tennessee.					
Andersonville	96	48	74.4	4.59	
Arlington †	98	49	77.5	3.08	
Ashwood *†	97	57	78.3	1.74	
Benton (near) †	90	47	75.5	3.87	
Bolivar †	90	48	76.6	2.19	
Bristol †	89	50	70.9	4.07	
Brownsville †	100	52	78.5	1.82	
Byrdstown	98	46	72.4	4.95	
Cagle	92	50	72.7	4.95	
Carthage †	.....	.....	.....	2.35	
Center Point	.....	.....	.....	0.83	
Charlotte	98	44	75.0	2.48	
Clarksville	95	48	74.6	3.39	
Clinton †	.....	.....	.....	3.88	
Covington	102	53	78.6	1.57	
Decatur †	97	48	75.2	3.52	
Dyersburg	99	54	79.8	2.54	
Elizabethton †	98	47	74.2	5.60	
Elk Valley	96	46	73.4	4.34	
Erasmus	90	38	69.7	3.28	
Fairmount *‖	90[f]	58	72.2[e]	2.36	
Florence †	96	48	76.0	1.49	
Franklin	96	46	75.6	2.05	
Greeneville †	90	47	71.8	7.39	
Harriman	95	46	74.1	3.52	
Hickory Withe	99	53	78.8	2.71	
Hohenwald †	98	41	73.6	2.69	
Jackson †	100	50	77.8	2.05	
Johnsonville †	.....	.....	.....	3.81	
Liberty †	96	47	75.4	1.75	
Loudon †	.....	.....	.....	3.25	
Lynnville †	97	50	76.6	1.57	
McKenzie †	98	52	77.2	2.06	
McMinnville †	94	47	73.8	3.90	
Milan †	103	50	78.3	2.58	
Molino †	97	53	77.8	1.70	
New Market *‖	94	59	73.7	5.24	
Newport †	93	49	74.4	6.60	
Nunnelly *‖	97	55	75.5	5.06	
Oak Hill *‖	96	46	71.8	2.42	
Palmetto †	97	48	76.6	2.29	
Paris Landing *‖	93	53	74.8	2.46	
Pope	98	48	77.3	0.78	
Riddleton †	95	46	74.9	2.11	
Rockwood †	.....	.....	.....	2.57	
Rogersville †	89	47	71.4	6.33	
Rugby	91	40	71.5	2.21	
St. Joseph †	102	46	77.7	1.45	
Savannah	103	48	78.0	1.39	
Sewanee †	88	53	72.8	2.34	
Springdale *‖	90	62	75.9	3.08	
Springfield *‖	97	50	76.1	1.45	
Tellico Plains †	98	49	75.6	2.80	
Tracy City	93	42	72.8	.....	
Trenton	97	48	75.6	2.58	
Tullahoma †	97	43	73.6	1.10	
Union City †	100	49	76.6	4.17	
Waynesboro	98	46	76.4	1.03	
Texas.					
Albany *‖	85	52	73.0	4.08	
Arthur City †	.....	.....	.....	2.92	
Austin *b*	99	58	79.0	.....	
Ballinger †	102	52	78.4	1.23	
Beeville †	103	63	82.6	3.04	
Blanco †	96	56	78.8	1.75	
Boerne *†	97	63	79.8	2.15	
Bowie	97	52	77.4	6.17	
Brazoria †	99	64	80.8	0.54	
Bremond *‖	100	68	85.3	2.15	
Brenham †	104	63	82.9	2.02	
Brighton †	98	62	80.4	3.22	
Brownwood	108	57	81.7	3.17	
Burnet *‖	100	62	80.8	1.43	
Camp Eagle Pass †	105	68	84.7	1.50	
Childress	111	46	79.8	2.57	
Coleman *[3]	.....	56	75.2	4.40	
College Station	98	62[d]	79.9[d]	2.82	
Colmesneil	.....	.....	.....	1.66	
Columbia †	99	62	79.7	0.76	
Corsicana *b* †	104	58	81.6	3.46	
Cuero †	100	62	82.2	4.68	
Dallas †	102	56	79.2	4.00	
Danevang †	102	60	82.2	1.67	
Dean	104	44	74.4	1.28	
Dublin †	99	.....	.....	5.32	
Duval *‖	106	66	85.0	1.39	
Emory	99	55	79.6	4.44	
Estelle †	102	54	78.6	2.64	
Forestburg †	93	52	76.6	4.82	
Fort Clark	106	61	82.8	2.23	
Fort McIntosh	101	65	84.4	0.56	
Fort Ringgold †	102	67	84.0	1.47	
Fort Stockton	.....	.....	.....	T.	
Fort Worth †	103[c]	56[c]	80.8[c]	5.90	
Fredericksburg *†	97[c]	58[c]	78.9[c]	2.10	
Gainesville †	96	55	77.6	4.82	
Golindo	.....	.....	.....	7.40	
Grapevine †	99	55	77.9	3.80	
Hale Center †	100	52	74.6	1.41	
Hallettsville †	102	61	82.1	3.20	
Hearne †	100	65	83.3	2.85	
Henrietta †	95	53	76.4	1.87	
Hewitt	.....	.....	.....	5.10	
Houston †	99	66	81.3	0.91	
Huntsville †	101	61	81.6	2.17	
Junction City	99	56	81.1	2.38	
Kent	.....	.....	.....	2.36	
Lampasas †	102	53	80.8	2.12	
Langtry	100	66	83.0	3.80	
Llano *† [5]	103	60	83.2	3.25	
Longview †	105	50	82.6	3.89	
Lufkin †	103	60	83.0	3.13	
Luling †	100	61	82.5	3.29	
Marathon	100	50	74.4	3.80	
Marshall ‖	99	62	79.6	4.42	
Menardville	100	52	79.0	.....	
Midland	107	53	76.8	1.71	
New Braunfels †	97	61	81.0	2.93	
Orange †	94	62	79.4	0.52	
Panter †	.....	.....	.....	3.24	
Paris †	104	54	79.4	2.01	
Point Isabel *‖	90	78	82.8	1.75	
Rheinland †	105	48	79.6	1.83	
Roby	104	44	76.0	4.69	
Rocksprings	.....	.....	.....	3.01	
Runge †	.....	.....	.....	3.09	
San Antonio	100	63	82.8	2.48	
Sanderson †	104	54	77.8	3.35	
San Marcos *b* †	99	60	81.5	4.95	
Sierra Blanca †	103	42	76.4	2.43	
Stafford †	100	62	82.1	1.79	
Sulphur Springs †	107	56	81.4	5.22	
Temple *a*	99	60	79.9	9.20	
Temple *b*	102	59	80.8	8.40	
Tyler	102	58	80.9	3.46	
Valentine †	103	50	75.3	1.57	
Waco †	101	60	81.8	3.77	
Waxahachie †	105	54	81.8	4.30	
Weatherford †	97	55	79.0	4.20	
Wichita Falls †	.....	.....	.....	4.06	
Utah.					
Alpine City †	.....	.....	.....	0.47	
Blue Creek *[3]	97	38	66.7	T.	
Brigham City †	.....	.....	.....	0.55	
Castlegate	87	34	66.3	0.47	
Cisco †	100	41	70.6	T.	
Corinne	93	36	63.8	0.15	
Croydon	90	31	60.1	0.16	
Ferron	93	31	66.5	0.03	
Fillmore †	98	32	66.9	0.26	
Fort Duchesne †	93	31	62.8	0.02	
Frisco	92	26	66.4	0.11	
Giles †	101	38	65.4	T.	
Heber	92	28	58.2	0.38	
Kelton *[3]	90	48	68.6	0.00	
Levan †	92	31	63.2	0.41	
Loa †	88	23	57.6	0.22	
Logan †	88	40[c]	63.2[c]	0.56	
Manti †	104	28	64.4	0.18	
Millville	.....	.....	.....	0.06	
Minersville	94	36	65.6	0.03	
Moab †	97	43	72.1	0.14	
Mount Pleasant †	100	32	65.8	0.39	
Ogden *a* [3]	96	40	72.5	0.98	
Pahreah	96	36	68.1	0.00	
Park City †	78	28	52.0	0.39	3.0
Parowan †	89	33	63.0	0.02	
Pinto	92	28	61.3	0.05	
Promontory *[3]	97	46	70.6	0.00	
Richfield †	92	20	59.0	0.00	
St. George †	104	45	75.1	0.00	
Scipio †	91	27	63.1	0.21	
Snowville	90	31	60.5	0.26	
Soldier Summit †	90	20	54.2	0.12	1.2
Terrace *[3]	94	40	68.7	0.00	
Thistle †	90	23	58.2	0.77	
Tooele †	93	38	66.4	0.16	
Tropic	87	31	60.8	0.26	
Vernal	89	36	65.4	0.23	
Woodruff	84	26	51.6	0.00	
Vermont.					
Bennington	85	36	61.6	6.33	
Brattleboro	88	38	63.4	4.85	
Burlington †	81	43	64.1	5.63	
Chelsea †	84	34	57.5	4.49	
Cornwall	84	40	61.0	4.92	
Enosburg Falls	83	33	60.6	3.46	
Hartland †	83	35	58.5	6.51	
Jacksonville	84	33	56.4	5.80	
St. Johnsbury	83	37	59.8	6.02	
Strafford *†	82	38	59.4	5.25	
Vernon *[6]	85	50	64.5	5.96	
Wells	84	33	61.0	5.26	
Woodstock	89	34	60.6	6.23	
Virginia.					
Alexandria	94	43	71.0	3.43	
Ashland †	96	46	72.2	3.64	
Barboursville	94	45	70.6	3.63	
Bedford City	96	45	72.1	3.68	
Bigstone Gap †	90	38	69.0	3.62	
Birdsnest *†	94	60	73.5	3.25	
Blacksburg	90	39	67.4	2.34	
Buckingham †	97	43	71.4	1.90	
Burkes Garden	87	37	67.6	3.80	
Callaville †	66	47	73.2	0.99	
Christiansburg †	.....	.....	.....	2.04	
Clarksville †	.....	.....	.....	2.68	
Clifton Forge	94	40	68.4	3.83	
Dale Enterprise †	95	40	69.2	2.88	
Danville †	.....	.....	.....	2.08	
Doswell	100	48	77.6	.....	
Farmville	103	45	76.2	3.85	
Fredericksburg †	97	46	71.9	3.63	
Gordonsville	89	57	73.4	.....	
Goshen	.....	.....	.....	4.75	
Grahams Forge	89	42	69.0	4.14	
Hampton	93	58	74.0	2.43	
Hot Springs	91	50	72.8	3.52	
Leesburg	102	38	70.4	.....	
Lexington †	91	44	69.9	3.33	
Maidens	.....	.....	.....	1.75	
Manassas †	94	41	70.5	7.19	
Marion †	89[d]	43[d]	69.9[d]	5.83	
Monterey	89	40	64.7	3.25	
Petersburg †	98	45	73.9	2.19	
Quantico	95	41	70.5	.....	
Radford †	.....	.....	.....	2.13	
Richmond (near) †	101	46	73.9	2.11	
Rockymount †	96	48	74.6	1.09	
Salem †	93	48	73.2	1.31	
Saltville	88	41	69.9	4.07	
Spottsville †	98	47	74.0	0.71	
Stanardsville †	93	45	69.7	3.51	
Staunton †	94	42	70.0	2.18	
Stephens City †	89	40	69.2	4.16	
Sunbeam †	97	49	73.9	1.23	
Swords Creek	89	44	70.3	2.99	
Warrenton	93	51	71.0	3.54	
Warsaw †	95	48	71.6	4.14	
Westbrook Farm	99	45	72.5	.....	
Woodstock †	96	45	70.9	3.37	
Wytheville	88	44	69.2	1.98	
Washington.					
Aberdeen	74	43	57.8	4.76	
Anacortes	.....	.....	.....	1.48	
Ashford †	.....	.....	.....	3.08	
Blaine †	82	32	56.1	3.28	
Bridgeport	97	40	68.4	0.80	
Cascade Tunnel	75	28	45.0	.....	
Centerville †	93	34	62.2	0.43	
Chehalis †	90	35	61.2	2.58	
Colfax †	84	32	59.3	2.82	
Coupeville †	74	38	57.4	0.84	
Dayton	88	41	62.5	2.94	
Ellensburg †	85	33	61.6	0.80	
Ellensburg (near)	94	40	65.4	0.50	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Simcoe†	96	41	65.2	1.15	
Fort Spokane	85	35	62.8	2.55	
Grandmound†	86	40	60.1	1.54	
Hunters†	76	29	54.2	4.01	T.
Kennewick†	100	38	68.0	0.50	
La Center	87	40	61.0	2.69	
Lakeside	87	41	64.6	1.25	
Lapush†	70[d]	43[d]	57.4[d]	2.77	
Lind	94	36	65.3	1.58	
Loomis†	91	38	66.2	2.32	
Madrone†	78	40	59.2	1.79	
Mayfield†	85[c]	34[c]	60.2[c]	3.15	
Moxee Valley†	94	35	68.6	0.68	
New Whatcom[b]	81	38	57.5	2.53	
Northbend	86	38	59.6	5.33	
Olga	75	44	57.6	1.29	
Olympia†	81	34	58.8	1.49	
Pinehill†	88	38	62.8	0.89	
Pullman†	84	38	59.4	2.34	
Rosalia†	81	35	58.4	3.16	
Sedro†	85	43	62.8	3.12	
Silvercreek*[1]	86	42	57.8	3.90	
Snohomish†	83	38	55.0	3.55	
Southbend	80	40	58.8	3.77	
Stampede[c]	74	42	61.7	3.93	
Stillaguamish	81	36	59.4	1.55	
Sunnyside†	96	38	67.8	0.30	
Union City†	85	38	61.6	2.49	
Vashon†	80	41	58.9	2.62	
Waterville†	89	30	58.0	0.58	
Wenatchee Lake	85	32	55.8	.....	
West Ferndale	85	39	60.0	4.03	
West Virginia.					
Beckley	90	36	70.8	2.11	
Beverly†	90	38	68.0	5.24	
Bluefield†	95	44	71.8	4.39	
Buckhannon *a*†	.....	.....	.....	6.42	
Buckhannon *b*	91	37	68.4	.....	
Burlington†	93	35	67.8	1.31	
Charleston†	.....	.....	.....	5.36	
Clay[g]	94	44	71.4	.....	
Dayton†	.....	.....	.....	4.07	
Elkhorn†	89	43	69.8	5.87	
Fairmont†	.....	.....	.....	3.83	
Glenville†	87	41	67.8	6.40	
Grafton†	88	38	67.7	5.15	
Green Sulphur	88	40	69.8	4.62	
Harpers Ferry†	.....	.....	.....	3.20	
Hewett†	93	40	71.8	3.48	
Hinton *a*†	.....	.....	.....	3.42	
Hinton *b*†	93	41	71.4	.....	
Huntington	91	43	71.4	3.29	
Kingwood	85	36	65.0	3.60	
Marlinton†	86	37	65.2	5.59	
Martinsburg†	90	41	68.4	3.18	
Morgantown *a*†	.....	.....	.....	5.09	
Morgantown *b*†	91	40	67.8	5.77	
New Martinsville†	91	41	70.4	4.16	
Nuttallburg†	88	35	71.6	4.15	
Oldfields†	90	36	68.2	1.94	
Philippi†	.....	.....	.....	7.89	
Point Pleasant†	96	46	72.8	5.46	
Powellton	89	43	69.8	6.63	
Romney	91	40	70.8	2.45	
Rowlesburg†	.....	.....	.....	4.57	
Tannery*[1]	81	38	62.9	.....	
Weston *a*	.....	.....	.....	5.34	
Weston *b**†[1]	90	47	70.6	.....	
Wheeling *a*†	.....	.....	.....	2.76	
Wheeling *b*†	93	45	71.2	3.22	
White Sulphur Springs†	92	38	68.2	6.55	
Wisconsin.					
Amherst	94	29	61.7	9.86	
Antigo	96	26	60.0	6.42	
Barron	96	22	60.0	6.23	
Bayfield	88	32	56.8	4.41	
Beloit	93	.....	.....	5.77	
Butternut	98	33	60.8	6.54	
Chilton	94	34	63.1	4.69	
Citypoint	100	34	66.9	5.70	
Crandon†	98	25	61.8	2.95	
Delavan	96	34	64.7	4.85	
Dodgeville†	.....	34	.....	6.70	
Easton†	97	25	63.4	4.10	
Eau Claire	96	25	61.8	5.05	
Florence†	93	23	58.7	5.36	
Fond du Lac	95	35	63.6	4.99	
Wisconsin—Cont'd.					
Grand River Lock	.....	.....	.....	3.27	
Grantsburg†	98	23	61.7	7.93	
Gratiot	98	35	67.7	7.95	
Hartford	.....	.....	... ..	3.14	
Hartland	92	35	64.6	3.47	
Harvey	96	34	64.9	6.39	
Hayward†	99	25	60.6	5.81	
Hillsboro	95	25	64.4	8.23	
Koepenick*†[1]	96	34	61.6	5.40	
Lancaster†	95	35	66.0	7.90	
Lincoln†[2]	.....	.....	63.8	8.20	
Madison†	94	38	66.4	4.03	
Manitowoc†	85	35	58.3	3.27	
Meadow Valley†	97	28	63.6	3.57	
Medford†	100	25	60.6	8.12	
Menasha	.....	.....	.....	5.38	
Neillsville†	94	26	62.8	6.04	
New Holstein	96	40	65.4	4.67	
New London	93	32	62.6	5.65	
Oconto	86	31	60.9	4.41	
Osceola†	99	25	60.9	7.30	
Oshkosh†	92	36	63.4	3.91	
Pepin	93	32	63.8	3.39	
Pine River†	96	30	64.0	4.55	
Portage†	97	31	64.8	6.48	
Port Washington	89	36	61.0	3.10	
Prairie du Chien	100	35[f]	68.7[c]	5.10	
Racine	92	38	62.7	3.41	
Sharon†	95	36	64.0	5.33	
Shawano	92	28	60.1	5.05	
Spooner†	98	22	60.8	3.34	
Stevens Point†	95	26	63.3	6.76	
Sturgeon Bay Canal*[10]	83	36	55.9	.....	
Valley Junction†	98	26	64.2	.....	
Viroqua	95	30	65.3	9.11	
Watertown†	94	34	64.2	5.61	
Waukesha†	93	39	64.8	3.14	
Waupaca†	95	30	63.6	8.88	
Wausau†	96	29	61.8	5.17	
Wausaukee	95	29	61.7	.....	
Westbend	94	36	62.4	3.37	
Westfield†	96	32	64.8	5.55	
Whitehall	100	33	66.0	5.42	
White Mound†	99	27	66.2	8.25	
Wyoming.					
Big Horn Ranch	83	29	54.3	1.37	
Carbon	95	33	61.3	1.08	
Fort Laramie†	97	40	65.4	2.03	
Fort Washakie†	89	24	59.4	1.13	
Fort Yellowstone†	83	33	53.8	2.34	T.
Laramie	82	29	55.6	0.72	
Lusk†	98	33	63.3	0.79	
Sheridan	93	33	60.4	1.73	
Strong	96	35	62.4	1.12	
Sundance	89	32	58.2	4.19	
Wamsutter	104	31	65.4	0.03	
Wheatland	97	30	65.5	1.63	
Mexico.					
Ciudad P. Diaz	100	69	85.0	1.84	
Leon de Aldamas	91	56	72.7	4.51	
New Brunswick.					
St. John	70	45	55.4	3.87	
West Indies.					
Grand Turk Island	.....	.....	.....	0.00	
Kentucky.	°	°	°	*Ins.*	*Ins.*
Vanceburg	83	35	57.4	5.82	
Louisiana.					
Cameron	.....	.....	.....	2.05	
Missouri.					
Bethany	.....	.....	.....	2.03	
Nebraska.					
State Farm	95	35	61.3	1.94	
New Mexico.					
Bluewater	.....	.....	.....	1.80	.....
Socorro	90	44	68.1	1.20	
New York.					
Elizabethtown	.....	.....	.. ...	2.89	
North Carolina.					
Horse Cove	82	31	61.4	2.00	
Oregon.					
Comstock*[9]	89	40	57.0	1.28	
McMinnville	98	34	59.8	1.03	
Umatilla	....	.....	.....	0.62	
Pennsylvania.					
Dyberry	78	30	55.4	5.13	
South Dakota.					
Flandreau	90	28	57.2	1.98	
Texas.					
College Station	88	53	72.1	2.70	
Utah.					
Kelton*[3]	88	40	67.3	.....	
Wisconsin.					
Gratiot	.....	.....	.....	1.00	

Late reports for May, 1897.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alaska.					
Coal Harbor	62	29	42.6	0.71	T.
Killisnoo	56	30	43.4	8.40	
Arizona.					
Parker	.. ..	.....	.....	T.	
Walnut Grove	.....	.....	.....	0.02	
California.					
Indio*[3]	105	58	80.0	0.00	
Milton (near)*[1]	92	52	67.2	0.73	
Florida.					
Merritts Island	92	60	75.8	1.16	
Illinois.					
Cordova	.....	.....	.....	1.15	
Morgan Park	80	30	52.4	2.06	
Iowa.					
Osage	.....	.....	.....	1.71	
Rock Rapids	89	28	56.1	0.38	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

‡ Record furnished by the Arrowhead Reservoir Company, in the San Bernardino Mountains, San Bernardino County, Cal., at elevations varying from 5,150 to 5,350 feet.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "[a]" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

Louisiana, Opelousas, April, 1897, make mean temperature 69.6[d] instead of 68.0[d].

Mississippi, Bay St. Louis, May, 1897, make precipitation 0.29 instead of 0.19.

Michigan, St. Ignace, January, 1897, make minimum temperature —10 instead of —15; make mean temperature 19.8 instead of 18.4; February, make mean temperature 19.4 instead of 13.7.

The following changes have been made in names of stations:

Kansas, Morton, changed to Viroqua.
Oklahoma, Pondcreek changed to Jefferson.

May Review, page 200, fourth line, heading, for South Carolina read West Virginia.

TABLE III.—*Data from Canadian stations for the month of June*, 1897.

Stations.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.	Total depth of snow.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.		
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
St. Johns, N. F	29.65	29.79	— .18	47.2	— 4.2	3.32	.....	ne.	
Sydney, C. B. I	29.85	29.91	— .02	53.2	— 1.3	1.50	— 2.19	sw.	
Grindstone, G. St. L.	29.77	29.80	.....	49.9	.....	2.85	.....	n.	
Halifax, N. S	29.80	29.93	— .01	55.2	— 2.3	6.05	+ 2.15	w.	
Grand Manan, N. B.	29.84	29.89	— .07	54.0	.....	5.21	+ 2.91	w.	
Yarmouth, N. S.	29.84	29.92	— .01	53.0	— 2.0	5.24	+ 3.10	nw.	
St. Andrews, N. B.	.....	.....	.....	.....	.....	.....	.....	.....	
Charlottet'n, P. E. I.	29.84	29.88	— .06	55.0	— 2.9	3.73	+ 0.98	w.	
Chatham, N. B	29.86	29.88	— .02	56.4	— 1.6	2.39	— 1.90	w.	
Father Point, Que.	29.84	29.87	+ .01	51.2	— 1.8	1.84	— 0.85	e.	
Quebec, Que	29.54	29.86	— .03	56.6	— 3.9	2.56	— 0.71	ne.	
Montreal, Que	29.68	29.88	— .02	60.3	— 4.2	3.76	+ 0.57	sw.	
Rockliffe, Ont	29.38	29.88	— .02	57.6	— 0.4	3.98	+ 1.23	nw.	
Kingston, Ont	29.60	29.91	— .03	59.8	— 2.2	2.31	— 0.09	sw.	
Toronto, Ont	29.57	29.95	— .01	60.8	— 0.7	2.91	+ 0.19	n.	
White River, Ont	28.62	29.95	.00	55.0	— 3.7	0.87	— 1.10	w.	1.2
Port Stanley, Ont	29.34	29.97	+ .02	60.6	.....	1.45	— 1.57	n.	
Saugeen, Ont	29.26	29.97	+ .03	55.6	— 2.4	2.71	+ 0.34	nw.	
Parry Sound, Ont.	29.24	29.93	.00	56.5	— 2.5	2.04	— 0.17	w.	
Port Arthur, Ont	29.22	29.91	.00	54.8	— 1.2	3.39	+ 0.58	w.	
Winnipeg, Man	29.04	29.85	.00	60.6	— 0.9	2.31	— 1.53	n.	T.
Minnedosa, Man	28.10	29.86	+ .04	58.2	— 1.3	1.88	— 1.91	e.	
Qu'Appelle, Assin.	27.64	29.85	+ .03	58.7	— 2.3	4.81	+ 1.46	nw.	
Swift Curr't, Assin.	27.34	29.86	+ .04	60.7	+ 2.7	0.83	— 2.72	n.	
Calgary, Alberta	26.36	29.83	— .02	55.6	+ 0.1	6.13	+ 3.79	w.	
Prince Albert, Sask.	28.32	29.80	.....	57.1	... .	2.89	.....	ne.	
Edmonton, Alberta.	27.58	29.87	+ .03	58.1	+ 1.6	4.30	+ 2.01	se.	
Battleford, Sask	28.16	29.85	.....	60.4	.....	3.87	.....	se.	
Kamloops, B. C.	28.63	29.84	.....	64.4	.....	1.76	.....	w.	
Hamilton, Bermuda	29.95	30.11	— .01	75.2	.....	9.57	.....	sw.	
Banff, Alberta	25.30	29.89	... .	50.6	.....	5.06	.....	ne.	1.8
Esquimalt, B. C.	29.94	29.97	... .	55.8	.....	0.86	....	sw.	
Ottawa, Ont	29.58	29.98	.....	60.7	.....	3.03	.....	nw.	
May, 1897.									
Medicine Hat, Assin	27.62	29.86	.00	61.8	+ 6.3	0.59	— 0.57	e.	

Table IV not received.

TABLE V.—*Mean temperature for each hour of seventy-fifth meridian time, June, 1897.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N Dak.....	58.3	57.0	56.0	55.4	54.8	53.9	54.1	56.3	58.3	60.8	63.3	65.6	67.0	68.6	70.0	71.0	71.8	71.5	70.7	69.7	66.8	63.9	61.6	59.9	62.8
Boston, Mass.	57.6	57.0	57.5	56.1	55.7	56.4	58.5	61.0	63.1	64.5	65.1	65.7	66.2	66.3	67.1	67.0	66.9	66.0	64.4	61.9	61.0	59.9	59.0	58.5	61.7
Buffalo N Y.....	59.2	58.3	57.6	57.1	57.2	57.9	59.2	60.5	61.7	63.0	63.6	64.6	65.1	65.2	65.0	65.1	64.9	64.4	63.6	63.1	62.1	61.5	60.8	60.2	61.7
Chicago, Ill.....	62.8	62.3	61.8	61.6	60.8	60.4	60.8	62.8	63.6	64.9	65.4	66.1	66.2	66.7	66.5	66.3	66.7	66.8	66.2	65.4	64.5	64.3	63.8	63.9	64.2
Cincinnati, Ohio.....	67.2	66.1	65.2	64.5	64.0	63.7	64.7	66.3	68.7	71.5	73.3	75.0	76.5	77.9	78.8	79.6	80.0	79.7	78.3	77.1	75.0	73.2	71.2	69.8	72.0
Cleveland, Ohio	61.8	61.2	60.4	59.3	58.9	58.4	59.6	61.2	62.7	63.3	64.7	65.3	66.6	66.9	67.3	68.2	69.3	69.5	69.0	68.1	66.4	65.4	64.2	63.4	64.2
Detroit, Mich.....	60.2	59.4	58.4	58.0	57.4	57.2	58.5	60.6	63.1	65.2	67.0	68.2	69.1	70.4	71.4	71.7	71.5	70.7	69.0	67.6	65.2	64.0	62.7	61.6	64.5
Dodge City, Kans.....	67.7	66.6	65.5	64.8	64.0	63.6	63.2	65.1	68.0	71.3	74.3	77.4	80.2	82.3	83.7	84.3	84.3	83.5	81.4	78.7	75.4	72.7	70.4	69.3	73.2
Eastport, Me.....	48.4	48.3	47.6	47.4	47.8	48.9	50.3	52.3	53.9	55.2	56.2	56.9	57.0	56.8	57.3	57.1	56.1	54.8	53.0	52.1	50.9	50.2	49.5	49.1	52.4
Galveston, Tex.....	79.5	79.4	79.2	79.0	78.7	78.4	78.2	79.4	80.0	81.1	82.1	83.1	83.9	84.5	85.0	84.9	84.4	83.7	82.9	81.9	81.3	80.6	80.0	79.7	81.3
Havre, Mont.....	56.8	55.8	54.6	54.1	52.8	51.9	51.1	52.9	55.5	58.1	60.6	63.2	65.8	67.1	69.0	70.1	71.2	71.2	70.7	69.4	68.3	64.9	61.7	59.2	61.5
Kansas City, Mo.....	71.1	70.2	69.3	68.8	68.1	67.6	67.5	68.3	70.4	72.3	74.3	76.5	78.5	80.6	81.9	82.6	83.5	82.9	81.3	78.8	76.6	74.8	73.6	72.3	74.7
Key West, Fla.....	80.0	79.7	79.6	79.7	79.5	79.8	81.2	82.3	83.2	84.0	84.4	84.8	84.4	84.2	84.2	83.8	83.8	83.1	82.6	82.0	81.3	81.1	80.8	80.4	82.1
Memphis, Tenn.....	74.2	73.4	72.3	71.2	70.5	69.8	70.0	72.9	74.9	77.2	79.5	81.7	83.2	84.5	85.7	85.7	86.7	85.9	84.9	83.9	80.8	79.9	78.0	76.2	78.5
New Orleans, La.....	77.8	77.2	76.6	76.0	75.6	75.3	75.2	78.5	81.0	83.0	84.4	85.5	86.3	85.7	86.2	84.8	84.9	85.0	84.6	82.7	81.2	80.1	79.3	78.6	81.1
New York, N. Y.....	60.9	60.2	59.7	59.3	59.2	59.5	60.5	62.3	64.3	66.1	68.0	69.1	69.8	70.2	70.2	70.4	70.0	68.7	67.7	67.0	65.6	64.3	63.4	62.3	64.9
Philadelphia, Pa.....	63.6	63.0	62.1	61.6	61.1	61.7	64.0	66.2	67.9	70.0	71.5	73.0	74.7	75.4	76.0	76.1	75.5	72.9	71.6	70.0	68.1	66.9	66.0	65.0	68.5
Pittsburg, Pa.....	63.2	62.2	61.4	60.9	60.2	60.6	62.2	64.7	67.4	69.7	70.6	72.5	73.3	74.4	75.1	75.8	75.8	75.3	73.5	72.1	69.9	68.1	66.5	65.4	68.4
Portland, Oreg.....	60.2	58.9	57.8	56.9	56.2	55.4	54.3	54.3	54.0	55.7	57.3	58.9	60.5	62.2	63.9	65.1	67.1	67.8	68.0	66.5	66.1	65.1	63.6	62.0	60.7
St. Louis, Mo.....	71.1	70.3	69.5	68.9	68.1	67.5	67.6	69.5	71.5	73.5	75.8	77.7	79.4	80.7	82.2	82.6	82.5	81.4	79.9	78.1	77.1	75.5	73.9	72.6	74.9
St. Paul, Minn.....	60.1	58.9	57.8	56.9	56.2	55.7	56.5	58.1	60.4	62.6	64.7	67.2	69.3	70.6	71.0	71.3	70.6	70.6	70.0	69.3	67.8	65.9	64.2	62.8	64.1
Salt Lake City, Utah..	63.9	62.3	60.6	59.6	58.3	57.4	57.0	58.3	59.8	62.9	65.9	69.2	70.9	72.6	73.9	74.8	75.3	75.2	75.1	75.1	74.0	70.8	68.1	66.3	67.0
San Diego, Cal.....	61.8	61.5	61.0	60.8	60.7	60.4	60.3	60.2	60.0	61.0	62.3	63.7	64.9	65.3	65.8	66.0	66.5	66.2	65.9	65.4	64.4	63.1	62.4	62.2	63.0
San Francisco, Cal....	55.3	54.6	54.3	54.1	53.6	53.6	53.6	53.5	53.9	55.5	57.8	60.1	62.3	63.7	64.0	63.1	62.8	61.9	61.4	60.3	59.1	58.1	56.4	55.8	57.8
Savannah, Ga.....	75.4	74.8	74.4	73.9	73.5	73.7	75.6	79.6	82.2	85.1	87.3	88.5	89.6	89.8	88.8	87.8	85.7	83.7	81.6	80.1	78.8	77.8	77.2	76.7	80.9
Washington, D. C....	63.6	63.2	62.4	61.7	61.1	61.6	64.4	67.1	69.6	71.6	73.2	75.0	76.1	77.4	77.3	76.6	75.6	74.9	73.1	71.1	69.2	67.9	66.4	65.7	69.4

TABLE VI.—*Mean pressure for each hour of seventy-fifth meridian time, June, 1897.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak...	28.136	.138	.136	.136	.141	.144	.151	.155	.159	.158	.153	.149	.145	.137	.127	.119	.108	.102	.097	.099	.104	.113	.123	.129	.132
Boston, Mass.....	29.795	.791	.784	.782	.790	.799	.807	.805	.802	.799	.793	.784	.774	.766	.764	.761	.759	.764	.773	.783	.795	.797	.799	.798	.786
Buffalo, N. Y.....	29.129	.129	.125	.130	.137	.147	.154	.159	.164	.163	.161	.157	.149	.143	.136	.130	.126	.123	.123	.124	.131	.132	.133	.130	.139
Chicago, Ill.	29.092	.086	.085	.086	.096	.109	.116	.126	.127	.125	.119	.118	.115	.108	.102	.096	.092	.084	.083	.079	.082	.091	.092	.093	.100
Cincinnati, Ohio ...	29.332	.329	.330	.328	.333	.346	.351	.357	.365	.361	.362	.357	.348	.337	.328	.315	.308	.302	.303	.309	.316	.325	.332	.331	.333
Cleveland, Ohio	29.160	.158	.158	.160	.168	.174	.184	.194	.203	.202	.201	.196	.188	.181	.168	.159	.152	.148	.146	.148	.152	.157	.161	.157	.170
Detroit, Mich.....	29.193	.192	.191	.193	.204	.208	.217	.221	.222	.222	.218	.211	.207	.199	.189	.184	.181	.174	.175	.177	.186	.192	.194	.194	.198
Dodge City, Kans..	27.308	.307	.304	.302	.304	.306	.318	.328	.333	.335	.334	.330	.324	.314	.300	.286	.273	.262	.258	.267	.277	.287	.302	.312	.303
Eastport, Me.....	29.800	.801	.803	.807	.813	.819	.824	.826	.824	.823	.817	.811	.802	.794	.791	.786	.784	.789	.795	.801	.809	.810	.810	.806	.806
Galveston, Tex.....	29.990	.983	.979	.977	.977	.983	.992	.995	.998	.009	.014	.016	.016	.006	.995	.980	.970	.960	.955	.956	.961	.978	.989	.996	.987
Havre, Mont.....	27.243	.247	.248	.246	.245	.249	.257	.260	.261	.261	.260	.260	.253	.247	.243	.234	.226	.221	.216	.215	.226	.234	.245	.247	.244
Kansas City, Mo....	28.928	.932	.927	.925	.931	.944	.948	.957	.962	.961	.959	.954	.946	.934	.923	.910	.897	.889	.889	.893	.891	.909	.920	.928	927
Key West, Fla.....	30.041	.033	.023	.019	.021	.028	.039	.052	.057	.060	.061	.061	.053	.041	.030	.022	.017	.018	.029	.039	.051	.057	.060	.052	.040
Memphis, Tenn.....	29.575	.568	.564	.567	.576	.584	.601	.613	.624	.624	.626	.627	.615	.604	.586	.569	.552	.540	.537	.540	.545	.556	.571	.578	.581
New Orleans, La....	29.959	.953	.952	.953	.958	.968	.982	.993	.997	.998	.990	.986	.977	.967	.953	.942	.933	.926	.928	.934	.944	.952	.957	.960	.961
New York, N. Y....	29.629	.624	.621	.623	.628	.636	.641	.645	.640	.637	.631	.623	.614	.606	.597	.591	.591	.594	.600	.608	.622	.631	.633	.631	.621
Philadelphia, Pa....	29.843	.839	.837	.840	.847	.852	.861	.868	.867	.865	.859	.848	.836	.827	.817	.811	.808	.812	.818	.822	.836	.840	.844	.845	.839
Pittsburg, Pa.....	29.093	.092	.091	.093	.098	.107	.116	.119	.122	.121	.120	.114	.103	.094	.082	.077	.074	.072	.073	.079	.084	.089	.090	.090	.096
Portland, Oreg.....	29.839	.841	.846	.847	.847	.848	.849	.853	.855	.857	.859	.860	.857	.854	.845	.840	.831	.826	.819	.813	.811	.813	.818	.826	.840
St. Louis, Mo.....	29.380	.378	.379	.380	.385	.396	.409	.417	.417	.420	.415	.409	.401	.390	.376	.366	.359	.353	.352	.350	.350	.363	.375	.376	.383
St. Paul, Minn.....	29.016	.013	.015	.019	.018	.023	.029	.029	.034	.033	.030	.026	.016	.005	.999	.993	.986	.983	.980	.978	.980	.991	.000	.005	.008
Salt Lake City, Utah	25.559	.562	.566	.567	.570	.572	.583	.590	.601	.606	.610	.609	.603	.598	.585	.574	.563	.555	.546	.543	.545	.548	.557	.564	.574
San Diego, Cal.....	29.836	.833	.825	.818	.812	.811	.812	.818	.826	.835	.843	.846	.849	.848	.843	.839	.834	.829	.830	.812	.813	.817	.824	.835	.828
San Francisco, Cal..	29.811	.808	.805	.802	.799	.799	.800	.803	.813	.821	.828	.831	.831	.831	.827	.820	.811	.802	.795	.787	.788	.791	.798	.809	.809
Savannah, Ga.....	29.913	.906	.902	.905	.914	.923	.934	.941	.945	.945	.940	.930	.913	.897	.883	.872	.871	.874	.897	.905	.916	.923	.923	.921	.912
Washington, D. C...	29.863	.862	.860	.861	.870	.878	.885	.889	.889	.892	.889	.881	.866	.854	.842	.838	.836	.835	.839	.847	.857	.863	.866	.863	.864

TABLE VII.—*Average wind movement for each hour of seventy-fifth meridian time, June, 1897.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex.	9.8	10.1	10.7	10.2	10.5	11.1	11.3	10.9	12.1	14.1	14.7	14.0	14.3	14.3	14.3	14.4	14.0	14.5	14.3	13.1	10.4	9.2	9.0	9.2	12.1
Albany, N. Y.	4.9	5.1	5.0	4.7	4.7	5.0	5.8	6.8	7.5	8.9	9.7	10.4	11.0	12.0	11.8	11.8	11.4	10.5	8.5	7.9	6.8	5.9	5.5	5.3	7.8
Alpena, Mich.	6.3	6.2	6.5	5.8	5.9	6.1	7.1	7.8	7.8	8.2	8.8	9.6	10.0	10.1	10.8	11.4	10.9	10.2	8.9	7.7	6.1	6.3	6.0	6.1	7.9
Amarillo, Tex.	16.8	15.7	15.1	14.4	14.1	13.9	13.4	13.1	14.8	17.7	18.2	18.0	17.1	16.0	16.7	17.3	18.8	19.9	20.1	19.6	14.8	16.9	17.1	16.9	16.5
Atlanta, Ga.	7.5	7.5	7.3	7.8	7.4	6.6	6.9	7.3	7.6	7.2	7.4	8.2	8.4	9.5	9.6	9.8	9.2	8.8	7.9	6.8	6.8	7.6	7.3	7.4	7.8
Atlantic City, N. J.	9.0	8.7	9.0	8.9	8.5	8.6	9.1	10.2	10.6	10.8	11.6	12.5	13.0	12.7	13.7	13.5	12.6	11.3	10.8	9.2	8.5	8.8	8.9	8.7	10.4
Augusta, Ga.	4.2	4.2	3.9	3.6	3.3	3.0	3.6	4.9	5.4	5.5	6.3	6.5	6.6	7.0	7.0	8.1	8.3	7.5	6.6	6.8	4.8	4.8	4.6	4.3	5.4
Baker City, Oreg.	4.0	3.9	4.7	4.8	5.6	5.4	4.8	5.7	5.3	4.3	3.7	4.0	4.6	5.4	6.6	6.9	7.5	7.4	7.7	8.1	7.6	6.1	4.7	4.2	5.6
Baltimore, Md.	3.2	3.3	2.9	2.6	3.3	3.3	4.0	4.6	5.2	6.4	6.6	7.0	6.9	6.8	7.2	6.5	6.7	6.2	5.4	4.2	3.8	3.2	3.3	2.8	4.8
Bismarck, N. Dak.	7.1	6.3	6.6	6.0	6.8	6.5	6.7	7.6	8.6	9.7	10.6	11.9	12.3	12.8	13.5	12.9	12.6	12.4	11.3	10.3	9.5	7.8	7.6	7.0	9.3
Block Island, R. I.	12.9	12.9	12.9	12.5	12.0	11.9	12.4	13.1	13.4	13.8	15.3	16.2	16.8	17.3	17.8	17.9	16.9	15.9	15.0	15.5	15.0	13.9	13.8	13.8	14.5
Boston, Mass.	9.6	8.9	9.2	9.0	9.1	9.2	10.0	9.8	10.5	11.2	12.3	12.7	13.0	13.8	14.4	14.9	14.3	12.8	11.4	11.0	10.2	10.3	9.8	9.1	11.1
Buffalo, N. Y.	10.3	10.7	10.7	10.2	10.3	9.7	9.6	10.7	11.1	12.2	12.1	12.0	13.1	13.7	13.9	14.3	13.5	13.0	12.4	10.8	10.3	10.1	9.9	9.8	11.4
Cairo, Ill.	5.8	6.1	6.8	6.5	5.4	5.3	4.8	5.1	5.8	6.5	7.4	7.4	8.3	8.6	8.2	8.4	8.6	8.3	7.3	6.5	6.0	6.3	6.0	6.4	6.7
Cape Henry, Va.	9.4	9.6	10.7	10.7	10.7	11.7	13.0	12.8	12.6	12.1	11.9	12.0	12.3	11.5	11.3	11.0	10.5	10.1	11.1	10.3	10.6	10.7	10.7	10.1	11.1
Carson City, Nev.	6.1	5.4	5.4	5.8	5.7	5.3	5.0	3.9	3.5	3.4	4.5	5.5	6.9	8.8	10.0	10.9	12.8	13.7	14.6	14.5	14.4	12.2	11.0	8.3	8.2
Charleston, S. C.	7.8	7.5	6.7	6.7	7.3	6.9	7.6	8.5	9.4	9.5	9.8	10.4	11.5	12.0	12.8	12.9	12.8	12.1	10.9	11.2	10.5	8.9	8.4	8.1	9.6
Charlotte, N. C.	4.7	5.0	5.0	5.0	4.6	5.3	5.3	5.8	6.8	6.5	6.3	6.1	6.1	6.7	7.2	7.6	7.5	5.7	5.4	5.1	5.2	5.1	5.1	5.0	5.8
Chattanooga, Tenn.	3.8	4.0	3.7	3.8	4.2	3.7	3.8	4.2	5.7	7.5	7.5	7.8	8.8	9.6	8.5	9.5	9.3	9.5	8.0	6.9	5.3	4.2	4.5	4.2	6.2
Cheyenne, Wyo.	7.1	7.8	7.8	8.0	8.3	7.6	8.0	7.6	8.3	9.7	10.9	11.2	12.5	12.2	11.6	11.9	12.2	12.6	13.1	12.2	10.1	8.1	7.8	7.7	9.8
Chicago, Ill.	13.7	15.0	15.5	15.8	14.4	14.5	15.0	14.2	14.8	16.1	15.6	17.0	16.6	15.9	16.1	16.2	15.7	15.6	15.2	14.2	13.5	13.3	14.0	13.7	15.1
Cincinnati, Ohio.	4.5	4.6	4.5	4.3	4.4	4.0	4.4	5.4	6.4	7.7	8.3	9.1	9.0	9.4	10.3	10.3	10.4	9.2	8.6	7.7	6.9	5.4	5.0	5.0	6.9
Cleveland, Ohio.	10.8	11.2	10.7	11.3	11.4	11.0	10.5	11.2	10.7	11.3	11.8	12.9	13.1	12.8	12.3	11.9	11.1	10.7	10.0	9.2	9.5	10.3	10.6	10.8	11.1
Columbia, Mo.	6.4	6.7	6.5	6.2	6.2	5.9	5.7	5.8	6.6	6.8	7.7	8.2	8.2	8.5	8.5	8.2	8.3	7.8	6.6	6.0	6.0	6.1	6.2	6.2	6.9
Columbus, Ohio.	3.8	4.1	3.6	3.8	3.2	4.1	4.2	4.9	6.1	6.6	7.9	8.4	8.9	9.3	9.5	8.9	9.2	8.2	7.5	6.2	5.4	5.1	5.1	4.2	6.2
Concordia, Kans.	7.6	6.5	6.0	5.3	5.6	6.0	6.4	6.9	7.9	9.0	9.7	9.6	9.0	9.3	9.8	10.0	9.7	9.9	10.4	8.9	7.5	7.5	6.9	7.1	8.0
Corpus Christi, Tex.	16.0	14.4	14.0	13.3	12.0	10.4	9.5	9.6	10.5	12.0	12.9	13.6	14.4	14.5	15.3	16.4	17.5	18.0	18.5	17.9	18.0	17.6	17.1	15.7	14.5
Davenport, Iowa.	6.0	5.8	6.2	5.5	5.0	5.2	6.0	6.7	8.1	8.1	8.5	8.3	9.1	9.1	9.6	10.0	9.2	8.8	8.6	6.9	6.0	5.7	5.3	5.4	7.2
Denver, Colo.	6.9	6.5	6.6	6.4	6.6	6.7	6.7	6.4	5.3	6.0	6.5	6.9	8.0	8.5	9.4	10.0	10.1	11.2	11.8	11.6	9.6	7.3	7.3	7.1	7.9
Des Moines, Iowa.	6.2	6.2	6.7	6.7	6.6	6.1	6.2	6.5	7.7	8.9	9.6	9.5	9.6	10.3	10.1	10.4	10.3	9.7	8.9	7.9	6.7	6.0	6.3	5.8	7.9
Detroit, Mich.	6.2	6.1	6.3	6.6	6.7	7.1	7.1	7.1	7.8	8.6	8.9	9.8	10.5	10.7	10.6	10.4	10.5	10.0	8.9	7.5	6.6	6.7	6.9	6.5	8.1
Dodge City, Kans.	12.1	10.7	9.5	9.4	9.1	8.6	8.2	8.8	10.9	12.6	14.0	14.2	14.3	15.6	16.8	17.5	17.8	18.0	18.1	16.0	13.2	13.3	13.4	13.2	13.1
Dubuque, Iowa.	5.7	5.4	6.0	5.4	5.6	5.5	5.3	6.2	6.7	6.9	7.7	7.4	7.9	8.0	8.1	8.4	8.6	8.3	7.5	6.2	5.1	5.5	5.8	5.4	6.6
Duluth, Minn.	7.6	7.9	8.1	8.6	8.0	7.8	8.1	7.9	8.6	9.0	9.5	10.0	10.0	10.7	10.4	10.4	10.5	10.1	9.2	8.5	7.5	7.7	7.7	8.1	8.8
Eastport, Me.	6.3	6.6	6.9	6.8	6.5	7.5	7.9	8.0	8.7	8.6	9.5	10.5	10.7	11.8	12.3	11.2	10.6	9.8	9.2	8.1	8.0	6.9	6.9	6.4	8.6
El Paso, Tex.	11.7	11.0	10.7	10.2	11.0	10.7	11.1	10.1	9.8	10.2	10.3	10.9	10.3	10.6	10.6	10.8	11.8	12.1	13.2	12.7	12.6	11.1	9.8	10.2	11.0
Erie, Pa.	7.3	7.3	8.2	8.6	8.7	8.6	8.7	9.2	10.4	10.3	10.0	10.0	10.0	10.0	10.2	10.3	8.8	7.9	7.0	6.3	6.2	6.4	6.9	6.5	8.5
Eureka, Cal.	5.1	4.2	4.0	3.6	3.7	3.6	3.3	3.7	3.7	3.7	4.3	5.7	7.2	9.2	9.8	10.6	11.1	11.3	10.9	10.5	9.9	9.1	7.4	6.0	6.7
Fort Canby, Wash.	9.6	9.3	9.4	8.9	9.3	9.0	8.9	8.9	9.1	8.4	8.5	8.9	8.6	9.3	10.2	11.4	12.4	12.2	12.4	11.9	12.3	12.1	11.6	11.7	10.2
Fort Smith, Ark.	4.5	4.5	5.2	5.0	5.3	5.1	4.8	5.1	5.8	6.4	7.2	7.3	7.7	8.0	8.9	8.9	8.2	7.6	6.6	5.4	4.7	4.7	4.6	4.9	6.1
Fresno, Cal.	11.6	11.3	10.6	9.1	8.1	7.2	6.6	6.0	5.5	6.0	6.6	6.3	5.9	5.6	5.7	6.1	6.6	6.9	7.4	8.0	9.1	10.1	10.8	11.1	7.8
Galveston, Tex.	11.0	11.7	11.2	11.0	10.5	9.7	9.7	9.7	10.5	10.8	11.3	11.0	11.7	11.7	11.8	11.9	12.5	11.7	12.0	12.0	10.9	11.5	11.2	11.1	11.2
Grand Haven, Mich.	7.9	7.8	8.0	7.6	7.1	6.9	7.4	8.0	8.5	8.4	9.5	10.4	10.5	11.4	11.2	11.4	9.8	8.6	8.0	6.7	6.2	5.7	6.4	7.1	8.4
Greenbay, Wis.	6.0	5.6	5.4	5.7	5.5	5.2	5.3	6.2	7.0	7.5	7.7	8.0	8.2	8.5	8.6	8.6	8.9	8.6	8.4	7.3	6.1	6.7	6.4	5.7	7.0
Hannibal, Mo.	8.1	7.2	7.2	6.7	6.9	7.2	7.4	7.5	8.7	9.4	10.2	11.5	11.8	11.4	11.6	11.1	11.8	11.0	10.5	9.3	7.6	7.4	7.6	8.4	9.1
Harrisburg, Pa.	4.6	4.0	4.1	4.2	4.1	4.2	4.5	5.2	6.2	6.9	7.3	7.8	8.7	9.2	9.5	9.3	8.6	8.1	7.0	5.9	5.6	5.2	5.0	4.8	6.2
Hatteras, N. C.	9.2	9.1	9.2	9.3	9.5	9.4	10.9	11.7	11.6	12.2	12.1	11.8	12.4	12.5	12.8	12.5	12.6	12.2	11.9	10.9	10.4	10.0	9.5	9.6	11.0
Havre, Mont.	7.3	7.2	8.3	7.4	7.7	7.4	6.9	7.0	7.9	9.0	9.8	9.8	10.4	10.9	10.9	11.9	11.9	12.3	11.9	12.3	11.8	11.9	10.6	9.3	9.7
Helena, Mont.	8.4	7.5	7.1	6.3	6.8	7.0	6.4	5.7	4.7	5.4	5.7	6.5	7.5	7.4	8.2	8.2	9.1	9.7	10.1	9.7	9.4	9.3	9.3	8.9	7.7
Huron, S. Dak.	9.3	8.8	8.6	8.3	8.8	9.2	8.5	8.7	10.1	11.6	11.9	12.2	13.2	13.2	13.6	13.5	13.6	13.7	12.5	11.5	9.5	9.0	9.7	9.3	10.8
Idaho Falls, Idaho.	9.2	11.6	10.6	10.4	9.1	8.6	8.6	8.4	8.1	9.0	10.1	11.9	12.4	12.5	14.3	15.7	16.4	16.7	16.2	17.0	14.7	11.6	11.9	10.2	11.9
Indianapolis, Ind.	6.7	7.0	6.8	7.4	7.1	6.5	6.5	7.4	8.5	10.2	10.7	10.6	11.2	11.9	12.5	12.3	11.8	11.5	10.2	8.3	7.6	7.8	6.9	6.6	8.9
Jacksonville, Fla.	7.0	6.7	6.5	5.7	5.4	5.2	5.8	6.4	6.8	6.6	6.4	6.5	7.1	7.8	8.6	8.5	9.4	9.6	9.3	7.9	8.3	7.8	6.9	7.1	7.2
Jupiter, Fla.	5.4	4.9	4.6	4.0	4.1	3.9	3.8	5.5	6.7	7.6	7.8	8.7	9.6	9.8	9.5	9.5	9.6	9.9	8.4	7.0	7.1	7.0	6.7	6.2	7.0
Kansas City, Mo.	7.6	8.0	7.9	7.6	7.3	6.4	5.9	6.8	7.9	8.6	8.9	9.5	10.0	10.1	10.5	10.7	10.8	10.2	9.0	9.0	7.9	7.7	7.9	7.6	8.5
Keokuk, Iowa.	6.6	6.4	6.6	6.7	6.7	6.8	6.3	6.7	7.8	8.0	8.4	8.9	9.0	9.8	9.8	9.3	8.7	8.7	8.5	7.5	5.9	5.3	6.3	6.1	7.5
Key West, Fla.	5.1	4.7	4.7	4.6	4.4	4.7	4.8	5.8	6.2	6.6	6.8	7.0	7.0	7.7	7.3	7.3	6.9	6.7	6.0	5.3	5.4	5.9	5.6	5.3	5.9
Kittyhawk, N. C.	10.5	10.4	11.4	11.4	12.2	12.6	13.6	13.7	13.5	13.7	13.1	13.3	14.1	14.1	14.0	14.6	14.4	14.1	13.8	13.1	13.2	12.5	11.2	11.1	12.9
Knoxville, Tenn.	2.4	2.6	2.7	2.9	2.8	2.6	3.2	4.1	4.6	5.3	5.8	6.9	6.9	6.9	7.5	7.0	6.5	6.5	5.5	4.5	3.1	2.7	2.9	2.6	4.5
La Crosse, Wis.	5.3	4.9	5.3	5.0	4.9	4.5	4.6	6.3	6.1	6.2	6.4	7.3	7.8	8.1	7.7	7.8	8.0	7.6	7.3	7.0	5.7	5.3	5.3	5.9	6.3
Lander, Wyo.	4.2	4.7	3.7	3.4	3.7	3.8	3.2	3.0	3.3	3.3	3.8	5.8	7.0	7.3	7.8	8.3	8.7	9.8	9.9	9.8	7.7	6.3	6.0	5.5	5.8
Lexington, Ky.	8.4	8.8	8.8	8.2	8.8	9.0	9.0	8.9	9.2	9.2	10.3	11.0	11.2	11.1	11.6	11.2	11.0	10.7	8.5	8.1	8.4	8.7	8.6	8.5	9.5
Little Rock, Ark.	3.0	4.4	3.7	3.2	4.0	3.7	4.8	5.5	6.2	7.2	8.1	7.8	8.3	8.9	9.4	9.4	9.7	9.5	8.1	6.5	5.0	4.3	3.7	3.6	6.2
Los Angeles, Cal.	2.9	2.8	2.7	2.1	1.9	1.8	1.8	2.0	2.2	2.7	2.9	3.3	3.8	5.0	6.6	8.3	9.9	9.9	9.1	8.8	7.6	6.1	4.7	3.3	4.7
Louisville, Ky.	5.6	5.9	6.1	5.3	5.4	5.5	5.7	6.8	7.0	7.5	9.1	8.9	9.6	10.3	10.2	10.5	10.3	9.7	8.8	7.5	6.5	5.7	5.3	5.2	7.4
Lynchburg, Va.	1.8	1.8	1.9	1.5	1.6	1.8	2.1	3.2	4.3	5.3	5.8	5.5	6.1	5.9	6.1	6.2	5.9	5.2	4.6	3.5	2.6	2.5	2.4	2.1	3.7
Marquette, Mich.	6.5	7.0	7.2	6.9	6.5	5.5	6.4	7.3	7.1	7.7	8.1	8.9	9.5	8.6	8.6	9.0	8.1	7.1	6.1	5.9	5.4	5.7	6.0	6.4	7.1
Memphis, Tenn.	7.4	7.5	7.3	8.1	7.4	6.7	6.4	6.7	7.5	7.1	8.0	9.1	9.9	9.3	10.1	10.6	9.9	9.0	8.4	7.0	6.7	5.8	6.5	7.8	7.9
Milwaukee, Wis.	6.7	7.1	7.2	7.5	7.9	7.3	7.4	8.2	9.6	9.3	9.4	9.7	10.4	10.7	10.8	10.2	9.8	8.5	8.3	7.3	6.1	6.2	5.9	6.3	8.2
Mobile, Ala.	4.3	4.2	4.1	4.2	3.9	3.7	3.6	4.2	5.6	5.6	6.6	7.7	9.2	10.0	11.6	12.9	12.6	11.5	9.7	7.7	6.1	5.4	5.1	4.8	6.8
Montgomery, Ala.	5.2	4.8	4.2	4.2	4.5	4.2	3.4	4.6	5.6	5.9	5.6	5.9	6.4	6.7	7.8	7.5	7.7	8.3	7.2	6.2	5.9	5.3	4.7	4.8	5.7
Moorhead, Minn.	8.6	8.2	7.9	8.3	8.0	7.8	8.0	8.8	9.0	10.0	11.2	11.5	11.7	11.6	12.7	12.7	12.5	12.1	11.5	10.6	9.1	8.1	8.2	8.3	9.8
Nantucket, Mass.	10.8	10.7	10.2	9.8	9.9	10.4	10.7	11.7	11.7	11.6	12.0	12.2	11.8	12.1	11.8	11.2	11.1	11.0	10.3	10.0	10.6	10.3	10.8	10.8	11.0
Nashville, Tenn.	3.2	3.2	3.7	4.1	4.1	3.9	3.6	4.6	5.6	6.7	7.8	8.5	8.5	8.6	8.4	9.2	8.6	8.5	8.5	6.4	5.3	4.7	4.1	3.7	6.0
New Haven, Conn.	6.6	6.1	6.3	6.2	5.3	4.9	5.7	6.9	7.7	8.7	10.7	10.7	11.3	11.7	12.1	12.6	12.6	11.5	9.8	8.0	8.2	7.7	6.3	5.9	8.5
New Orleans, La.	5.6	5.6	5.7	5.6	4.8	4.2	4.4	4.4	6.5	7.2	7.3	7.2	8.0	8.2	8.4	8.3	8.9	9.0	9.0	7.4	6.9	6.7	6.3	5.9	6.7
New York, N. Y.	10.8	10.1	10.4	9.4	10.2	9.4	9.5	10.1	10.9	11.7	12.9	14.0	14.3	14.5	15.3	16.7	16.8	16.6	15.2	14.4	13.6	12.7	12.2	11.0	12.6
Norfolk, Va.	6.2	6.6	6.8	6.6	6.1	6.4	7.2	7.5	8.2	8.2	8.0	8.1	8.3	8.6	8.4	8.9	8.2	8.1	8.4	6.8	6.5	6.6	6.6	6.7	7.4
Northfield, Vt.	5.7	5.1	5.6	5.5	5.3	4.3	5.8	7.6	9.1	10.8	12.5	12.4	13.3	13.0	12.1	11.7	11.2	10.4	7.3	6.3	5.8	6.1	6.5	6.4	8.3
North Platte, Nebr.	8.6	8.2	8.1	8.3	8.1	7.5	7.0	6.9	7.9	9.5	10.5	10.5	11.9	12.4	11.6	11.7	12.3	12.7	12.6	12.3	10.1	9.0	8.9	7.8	9.8
Oklahoma, Okla.	10.1	10.2	9.9	10.1	10.3	9.6	9.3	10.5	12.8	14.6	15.2	15.4	14.9	15.8	15.8	16.0	16.0	16.2	14.9	12.9	10.2	9.6	10.2	10.7	12.5
Omaha, Nebr.	7.4	7.4	7.8	7.2	7.1	6.7	7.3	8.0	8.3	9.1	10.0	10.3	10.6	10.7	10.8	10.2	10.5	10.0	9.5	9.1	7.7	7.1	7.1	7.6	8.6
Oswego, N. Y.	7.1	7.0	8.0	8.3	9.0	8.8	9.3	9.8	10.3	10.5	10.0	9.6	10.2	10.1	10.3	9.9	9.7	8.8	8.2	7.3	7.4	7.3	7.2	6.7	8.8
Palestine, Tex.	5.3	5.2	5.0	4.9	4.8	4.6	4.1	4.9	6.6	7.3	7.7	7.3	7.2	7.9	7.6	7.6	7.2	7.4	6.7	5.9	4.4	5.1	5.7	5.8	6.1
Parkersburg, W. Va.	3.8	3.7	3.5	3.2	3.1	3.3	3.2	4.3	5.0	5.3	5.8	6.6	6.9	7.0	7.7	7.4	7.2	5.9	5.4	4.4	3.7	3.3	3.8	4.0	4.9

TABLE VII.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Pensacola, Fla.	6.6	6.4	6.0	6.0	5.7	5.4	5.4	5.5	6.9	7.0	7.8	9.1	10.2	11.5	12.9	14.7	14.1	14.9	13.9	11.8	9.1	8.6	7.9	7.4	9.0
Philadelphia, Pa.	7.8	8.5	8.0	7.4	7.4	7.7	8.3	10.4	10.2	10.4	11.1	11.3	12.4	13.4	13.8	13.3	13.0	12.9	10.2	9.6	9.4	9.1	8.3	8.0	10.1
Phœnix, Ariz	3.5	3.2	3.2	3.1	3.3	3.7	4.0	4.7	4.5	4.6	4.4	4.2	3.9	4.4	5.1	5.5	6.2	6.7	7.0	6.5	5.1	4.8	4.4	3.4	4.6
Pierre, S. Dak.	9.3	8.5	8.3	7.4	7.7	6.9	7.5	7.6	8.0	9.3	9.8	10.3	11.5	11.7	11.2	10.6	11.6	11.2	11.1	10.6	9.7	9.1	8.8	8.9	9.4
Pittsburg, Pa.	3.4	3.4	3.1	3.4	3.4	3.6	4.3	5.0	6.1	6.4	6.9	6.8	7.2	8.2	8.0	8.0	8.3	7.3	5.8	5.2	4.8	4.7	4.3	3.4	5.5
Port Angeles, Wash.	6.2	5.9	6.0	6.4	6.2	5.7	5.0	5.4	5.3	4.9	6.4	7.3	8.2	8.6	8.6	9.0	9.8	10.8	11.4	10.7	10.6	9.5	8.2	6.8	7.6
Port Huron, Mich.	7.2	7.7	7.3	8.4	8.0	8.0	7.9	8.6	8.8	9.3	9.9	10.2	10.7	11.3	11.1	10.9	9.9	9.5	8.1	7.3	7.1	6.7	7.2	7.1	8.6
Portland, Me.	4.8	5.0	5.6	5.2	4.9	5.6	5.9	6.7	7.2	7.3	8.3	9.0	9.0	10.2	10.1	9.6	8.7	7.6	6.7	5.4	4.8	5.2	5.5	5.1	6.8
Portland, Oreg.	7.4	7.4	6.2	6.0	5.5	4.3	4.8	4.9	4.6	5.5	6.3	6.8	8.1	7.7	7.7	8.2	8.2	8.4	8.3	9.2	9.2	9.7	8.8	8.2	7.1
Pueblo, Colo.	5.5	6.0	5.0	4.9	4.5	4.2	4.2	3.9	4.5	4.4	5.0	6.2	6.9	7.7	8.4	10.2	11.0	12.3	14.7	13.0	11.8	9.5	7.3	6.1	7.4
Raleigh, N. C.	4.8	5.0	4.6	4.5	4.4	5.0	5.3	6.1	7.1	6.7	6.7	6.4	7.0	6.9	7.0	7.5	7.3	6.8	5.8	5.4	5.1	5.3	5.3	5.2	5.9
Rapid City, S. Dak.	6.3	5.5	5.7	5.0	5.3	6.2	5.4	5.2	5.9	7.5	8.7	9.7	10.9	10.6	9.8	9.7	9.4	9.2	9.8	8.2	7.8	6.8	6.2	6.3	7.5
Redbluff, Cal.	6.5	6.4	6.2	5.8	5.6	5.2	5.2	5.4	5.6	6.3	8.3	8.9	8.8	8.7	8.6	8.7	7.9	7.8	7.2	7.3	7.3	6.5	6.4	6.5	7.0
Rochester, N. Y.	5.8	5.6	5.4	5.7	5.7	5.8	6.4	7.0	7.5	7.8	8.3	8.5	8.8	9.2	9.1	9.5	9.5	8.2	7.2	5.9	5.5	5.5	5.5	5.4	7.0
Roseburg, Oreg.	2.5	2.5	2.0	2.1	1.9	2.1	1.6	1.8	1.8	2.2	2.8	3.2	3.7	4.3	4.8	5.4	6.4	6.9	6.8	7.6	7.6	6.4	5.1	3.3	4.0
Sacramento, Cal.	8.9	8.2	7.8	8.0	8.1	7.0	7.0	6.3	6.8	6.6	6.8	7.7	8.0	8.9	9.3	10.4	11.1	11.1	11.8	11.8	11.1	10.6	10.4	9.4	8.9
St. Louis, Mo.	7.6	8.2	7.2	8.1	7.7	7.2	7.5	8.0	8.4	9.4	9.0	9.7	10.6	10.4	10.2	10.8	10.6	10.0	9.2	8.5	7.7	7.4	7.4	7.7	8.7
St. Paul, Minn.	5.5	5.7	5.4	5.2	5.0	5.2	5.4	6.4	6.3	7.5	7.4	7.4	8.1	8.6	8.8	9.0	9.0	8.2	7.6	7.1	6.0	5.4	6.1	6.0	6.8
Salt Lake City, Utah.	6.1	4.8	4.9	5.0	4.7	4.8	5.0	3.8	3.6	3.8	4.5	6.3	8.4	8.7	9.1	10.0	9.8	9.8	8.5	7.5	7.1	6.5	6.5	6.3	6.5
San Antonio, Tex.	10.1	9.1	8.3	7.2	6.5	6.4	5.6	6.0	7.8	8.8	9.7	9.2	10.1	10.6	10.9	11.4	11.3	11.6	11.8	12.6	13.7	13.7	11.9	11.5	9.9
San Diego, Cal.	3.1	3.5	3.6	3.3	3.9	4.1	3.5	3.6	3.9	4.2	4.1	6.0	8.0	9.3	10.3	10.7	10.6	10.1	9.2	8.5	7.6	5.9	4.5	3.7	6.0
Sandusky, Ohio	6.0	6.4	6.8	6.6	6.4	6.7	7.1	7.0	7.1	7.8	8.3	9.0	9.1	9.4	9.3	8.9	8.3	7.6	7.2	6.9	6.3	6.8	6.6	6.2	7.4
San Francisco, Cal.	12.4	11.8	11.0	9.1	9.4	7.6	7.5	6.6	6.4	6.8	8.4	8.3	10.1	12.7	16.8	19.1	22.0	22.0	23.0	22.5	21.7	19.4	17.2	14.6	13.6
San Luis Obispo, Cal.	3.1	2.9	2.2	2.3	2.4	2.7	2.9	3.2	3.1	4.0	4.8	5.4	6.7	7.4	8.8	9.2	9.1	9.5	8.8	8.4	7.8	6.7	4.7	4.0	5.4
Santa Fe, N. Mex.	6.1	6.7	6.0	5.7	5.2	4.7	4.5	4.1	4.4	4.4	5.8	7.2	8.8	9.1	9.6	10.5	10.9	11.0	11.9	9.9	9.0	6.4	6.1	6.8	7.3
Sault Ste Marie, Mich.	5.7	5.5	4.9	4.4	4.7	4.9	4.9	5.6	6.0	7.3	8.4	10.3	11.6	12.5	13.2	13.4	12.5	11.2	10.0	8.4	7.4	6.6	6.8	5.7	8.0
Savannah, Ga.	5.3	5.6	5.4	5.3	5.3	5.0	5.2	6.1	6.8	6.9	7.3	7.4	7.9	8.8	10.3	10.2	10.4	9.3	8.8	8.0	6.8	7.0	6.7	5.7	7.1
Seattle, Wash.	3.8	3.0	3.6	3.6	3.7	3.5	3.8	3.3	3.2	4.0	4.9	5.4	5.9	5.6	5.8	5.8	6.0	6.3	6.2	6.5	6.3	5.8	4.9	4.0	4.8
Shreveport, La.	6.2	5.8	5.3	5.1	4.8	4.3	4.2	4.6	5.8	6.2	6.8	7.1	7.1	7.1	7.3	7.6	8.1	7.9	7.6	6.6	5.2	6.1	6.3	6.3	6.2
Sioux City, Iowa.	11.6	11.4	10.8	10.1	10.6	10.3	10.0	10.3	11.3	13.1	13.2	13.3	13.4	13.3	14.8	14.5	14.0	13.2	12.1	11.7	11.0	11.6	11.9	11.9	12.1
Spokane, Wash.	5.9	5.5	4.9	5.3	4.8	4.9	5.1	5.8	6.2	6.7	7.1	7.5	8.7	8.9	9.2	9.1	8.7	8.3	8.2	8.2	8.6	7.4	7.1	6.1	7.0
Springfield, Ill.	7.4	7.7	7.7	8.0	8.3	7.6	8.0	8.8	9.3	9.9	10.5	10.9	10.9	10.8	10.5	11.1	11.0	10.1	9.4	8.4	7.2	7.7	7.3	7.2	9.0
Springfield, Mo.	8.5	8.0	8.4	9.4	9.0	8.4	7.6	8.2	9.2	9.6	10.1	11.2	12.1	11.3	10.4	10.7	9.8	10.4	9.5	8.4	7.9	9.1	8.7	8.9	9.4
Tacoma, Wash.	5.7	5.1	4.8	4.7	4.6	4.7	4.3	4.5	4.1	4.8	5.6	6.8	7.0	7.4	8.0	7.7	7.6	7.2	7.4	6.9	7.0	6.6	5.5	5.6	6.0
Tampa, Fla.	3.5	3.8	3.3	3.8	3.4	2.9	3.4	4.3	5.3	6.0	6.6	6.7	7.9	8.9	8.9	9.3	9.0	8.2	7.3	5.5	5.1	4.2	4.0	3.6	5.6
Tatoosh Island, Wash.	7.4	10.2	10.1	10.1	9.8	9.6	8.8	9.9	9.7	9.6	10.4	10.8	10.5	10.9	9.9	10.9	11.0	9.7	9.6	10.3	10.5	9.2	8.3	7.0	9.8
Toledo, Ohio	7.1	6.7	6.3	6.2	6.8	6.6	7.1	7.4	8.2	8.6	9.7	10.4	10.9	11.2	11.3	11.3	10.4	10.1	9.2	7.7	6.8	6.8	6.7	6.9	8.4
Vicksburg, Miss.	4.9	4.5	4.8	3.9	3.9	3.8	3.6	3.8	4.3	5.0	5.5	5.6	5.9	6.0	6.2	6.6	6.2	6.0	5.1	5.3	4.4	4.2	4.0	4.4	4.9
Vineyard Haven, Mass.	7.9	7.6	7.1	7.3	7.6	7.9	8.6	8.9	9.2	9.6	10.0	10.2	10.6	11.1	11.0	10.9	10.3	9.9	9.4	9.1	9.9	9.0	9.1	8.0	9.1
Walla Walla, Wash.	5.8	5.6	5.4	5.4	5.6	5.7	5.2	5.6	5.4	5.9	7.1	7.0	7.0	7.0	7.3	7.0	7.0	7.5	7.3	7.4	7.0	6.4	6.1	5.9	6.4
Washington, D. C.	3.8	4.1	4.2	3.8	3.9	4.2	4.7	5.8	7.1	8.1	8.5	9.3	9.9	10.0	10.5	9.7	8.8	7.6	6.0	5.2	4.8	4.3	4.3	4.3	6.4
Wichita, Kans.	7.4	7.7	7.3	7.3	7.0	7.3	7.3	7.4	8.5	9.6	9.9	10.4	11.0	11.9	12.5	12.9	12.3	12.0	11.7	10.7	8.3	7.3	7.2	6.9	9.2
Williston, N. Dak.	6.5	6.2	6.7	6.8	6.4	6.1	6.3	7.4	8.3	8.8	9.7	10.4	12.1	12.6	12.7	12.5	12.1	12.5	12.1	10.9	8.7	7.1	6.3	6.7	9.0
Wilmington, N. C.	5.8	6.0	6.0	5.7	5.6	5.7	6.7	7.8	7.8	8.0	8.5	8.4	8.8	10.2	10.7	11.2	11.0	9.9	8.5	7.0	6.5	6.9	5.9	5.6	7.7
Woods Hole, Mass.	14.0	13.4	12.8	12.9	12.2	12.6	12.5	12.2	12.5	12.9	14.5	14.3	16.5	17.2	17.3	16.5	16.3	15.6	15.0	14.2	13.9	14.3	14.0	13.5	14.2
Yankton, S. Dak.	6.5	7.9	7.3	6.4	6.1	5.8	6.2	6.9	8.1	9.1	9.6	10.0	10.6	11.1	11.1	10.8	10.6	9.9	8.9	8.5	7.2	7.2	6.8	6.9	8.3

TABLE VIII.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of June, 1897.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	18	16	17	21	n. 63 w.	4
Portland, Me	20	18	14	21	n. 74 w.	7
Northfield, Vt	31	25	3	9	n. 45 w.	8
Boston, Mass	21	10	16	24	n. 36 w.	14
Nantucket, Mass	15	18	13	29	s. 79 w.	16
Woods Hole, Mass.*	7	15	5	9	s. 27 w.	9
Block Island, R. I	13	5	14	33	s. 84 w.	19
New Haven, Conn	29	21	10	25	s. 86 w.	15
Middle Atlantic States.						
Albany, N. Y	14	25	7	24	s. 57 w.	20
Binghamton, N. Y†	12	6	6	12	n. 45 w.	8
New York, N. Y	17	19	9	30	s. 28 w.	19
Harrisburg, Pa	18	12	14	25	n. 61 w.	12
Philadelphia, Pa	24	17	10	23	n. 62 w.	15
Atlantic City, N. J	24	16	10	26	n. 63 w.	18
Baltimore, Md	30	13	16	22	n. 41 w.	9
Washington, D. C	24	17	10	19	n. 49 w.	11
Lynchburg, Va	19	19	21	18	e.	3
Norfolk, Va	16	23	23	14	s. 52 e.	11
South Atlantic States.						
Charlotte, N. C	11	23	27	12	s. 51 e.	19
Hatteras, N. C	11	22	25	17	s. 36 e.	14
Kittyhawk, N. C	14	20	25	15	s. 59 e.	12
Raleigh, N. C	17	16	11	34	n. 86 w.	13
Wilmington, N. C	13	19	18	21	s. 27 w.	7
Charleston, S. C	8	27	14	23	s. 23 w.	21
Augusta, Ga	19	19	16	16	se.	
Savannah, Ga	13	25	13	22	s. 37 w.	15
Jacksonville, Fla	5	29	14	25	s. 25 w.	26
Florida Peninsula.						
Jupiter, Fla	7	37	17	12	s. 9 e.	30
Key West, Fla	6	25	38	5	s. 60 e.	38
Tampa, Fla	12	18	19	28	s. 56 w.	11
Eastern Gulf States.						
Atlanta, Ga	19	16	14	26	n. 76 w.	12
Pensacola, Fla	14	28	5	35	s. 65 w.	33
Mobile, Ala	19	22	5	25	s. 81 w.	20
Montgomery, Ala	14	22	13	23	s. 51 w.	13
Vicksburg, Miss	12	25	14	22	s. 32 w.	15
New Orleans, La	7	39	15	15	s.	32
Western Gulf States.						
Shreveport, La	11	35	16	11	s. 12 e.	24
Fort Smith, Ark	7	23	31	10	s. 53 e.	26
Little Rock, Ark	16	31	8	17	s. 31 w.	18
Corpus Christi, Tex	3	42	43	3	s. 46 e.	56
Galveston, Tex	6	43	14	5	s. 14 e.	38
Palestine, Tex	8	37	23	7	s. 29 e.	33
San Antonio, Tex	7	37	32	2	s. 45 e.	42
Ohio Valley and Tennessee.						
Chattanooga, Tenn	28	12	16	19	n. 11 w.	16
Knoxville, Tenn	24	8	14	25	n. 34 w.	19
Memphis, Tenn	12	25	13	19	s. 25 w.	14
Nashville, Tenn	19	17	11	25	n. 82 w.	14
Lexington, Ky	12	24	17	22	s. 23 w.	13
Louisville, Ky	20	22	15	15	s.	2
Indianapolis, Ind	17	21	13	23	s. 66 w.	10
Cincinnati, Ohio	18	19	16	21	s. 79 w.	5
Columbus, Ohio	20	14	14	23	n. 56 w.	11
Pittsburg, Pa	20	20	6	24	w.	18
Parkersburg, W. Va	22	23	14	15	s. 45 w.	1
Lower Lake Region.						
Buffalo, N. Y	15	19	8	30	s. 80 w.	22
Oswego, N. Y	7	20	9	34	s. 63 w.	28
Rochester, N. Y	12	17	7	37	s. 81 w.	30
Erie, Pa	16	16	10	27	w.	17
Cleveland, Ohio	22	18	11	21	n. 68 w.	11
Sandusky, Ohio	15	17	21	15	s. 72 e.	6
Toledo, Ohio	13	13	20	22	e.	2
Detroit, Mich	16	18	19	21	s. 45 w.	3
Upper Lake Region.						
Alpena, Mich	20	22	17	18	s. 45 w.	3
Grand Haven, Mich	17	18	16	26	s. 84 w.	10
Marquette, Mich	32	15	9	19	n. 30 w.	20
Port Huron, Mich	28	19	7	13	n. 34 w.	11
Sault Ste. Marie, Mich	18	10	16	30	n. 60 w.	16
Chicago, Ill	16	17	21	19	s. 63 e.	2
Milwaukee, Wis	15	18	23	17	s. 72 e.	10
Greenbay, Wis	13	21	21	19	s. 14 e.	8
Duluth, Minn	32	9	26	12	n. 31 e.	27
North Dakota.						
Moorhead, Minn	19	20	25	14	s. 85 e.	11
Bismarck, N. Dak	20	20	23	10	e.	13
Williston, N. Dak	25	18	15	12	n. 23 e.	8
Upper Mississippi Valley.						
St. Paul, Minn	17	20	20	20	s.	3
La Crosse, Wis.†	10	14	7	7	s.	4
Davenport, Iowa	9	23	21	21	s.	14
Des Moines, Iowa	14	24	17	20	s. 17 w.	10
Dubuque, Iowa	9	20	17	23	s. 29 w.	12
Keokuk, Iowa	14	31	12	18	s. 19 w.	18
Cairo, Ill	13	29	17	16	s. 3 e.	16
Springfield, Ill	8	25	15	21	s. 25 w.	19
Hannibal, Mo.†	2	17	4	11	s. 25 w.	17
St. Louis, Mo	7	31	16	17	s. 2 w.	24
Missouri Valley.						
Columbia, Mo.*	3	17	11	5	s. 23 e.	15
Kansas City, Mo	11	34	18	16	s. 5 e.	23
Springfield, Mo	5	36	21	8	s. 23 e.	34
Lincoln, Nebr	19	25	26	7	s. 72 e.	20
Omaha, Nebr	26	20	22	7	n. 68 e	16
Sioux City, Iowa†	9	10	12	6	s. 80 e.	6
Pierre, S. Dak	17	20	23	12	s. 75 e.	11
Huron, S. Dak	22	22	21	12	e.	9
Yankton, S. Dak	16	18	28	8	s. 84 e.	20
Northern Slope.						
Havre, Mont	20	14	16	26	n. 59 w.	12
Miles City, Mont	13	17	20	21	s. 14 w.	4
Helena, Mont	17	20	7	33	s. 83 w.	26
Rapid City, S. Dak	16	16	22	20	e.	2
Cheyenne, Wyo	22	17	9	26	n. 74 w.	18
Lander, Wyo	19	20	12	26	s. 86 w.	14
North Platte, Nebr	9	25	25	14	s. 34 e.	19
Middle Slope.						
Denver, Colo	22	16	11	14	n. 27 w.	7
Pueblo, Colo	24	13	18	22	n. 20 w.	12
Concordia, Kans	11	26	22	6	s. 47 e.	22
Dodge City, Kans	11	39	12	8	s. 8 e.	28
Wichita, Kans	6	44	11	7	s. 6 e.	38
Oklahoma, Okla	6	50	5	3	s. 3 e.	44
Southern Slope.						
Abilene, Tex	2	37	32	2	s. 41 e.	46
Amarillo, Tex	8	41	4	12	s. 14 w.	34
Southern Plateau.						
El Paso, Tex	22	10	24	23	n. 65 e.	29
Santa Fe, N. Mex	10	29	21	18	s. 9 e.	19
Phœnix, Ariz	19	3	23	24	n. 3 w.	16
Middle Plateau.						
Carson City, Nev	13	17	3	40	s. 84 w.	37
Winnemucca, Nev	13	21	12	29	s. 65 w.	19
Salt Lake City, Utah	16	24	24	12	s. 56 e.	14
Northern Plateau.						
Baker City, Oreg	23	25	12	17	s. 68 w.	5
Idaho Falls, Idaho	16	38	6	6	s.	12
Spokane, Wash	11	28	14	22	s. 25 w.	19
Walla Walla, Wash	9	32	12	15	s. 7 w.	23
North Pacific Coast Region.						
Fort Canby, Wash	17	13	10	27	n. 77 w.	18
Port Angeles, Wash.*	1	5	4	24	s. 79 w.	20
Seattle, Wash	17	25	15	14	s. 7 e.	8
Tacoma, Wash	22	19	3	28	n. 83 w.	25
Tatoosh Island, Wash	10	26	12	25	s. 39 w.	21
Portland, Oreg	26	19	8	28	n. 71 w.	21
Roseburg, Oreg	32	9	16	18	n. 5 w.	23
Middle Pacific Coast Region.						
Eureka, Cal	21	17	6	33	n. 82 w.	27
Redbluff, Cal	29	19	14	12	n. 11 e.	10
Sacramento, Cal	16	28	4	35	s. 69 w.	33
San Francisco, Cal	1	14	1	50	s. 75 w.	51
South Pacific Coast Region.						
Fresno, Cal	37	4	2	39	n. 49 w.	50
Los Angeles, Cal	9	18	19	28	s. 45 w.	13
San Diego, Cal	13	22	4	33	n. 73 w.	30
San Luis Obispo, Cal	20	19	2	13	n 85 w.	11

*From observations at 8 p. m. only. †From observations at 8 a. m. only.

TABLE IX.—*Thunderstorms and auroras, June, 1897.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	50	T.	....	2	4	5	1	....	3	6	1	...	1	3	1	5	9	7	3	2	2	2	....	1	5	....	2	6	2	5	5	5	....	88	25	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	49	T.	....	....	....	....	....	....	....	..	1	1	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	..	6	6	....	....	16	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	50	T.	12	11	12	....	....	6	1.	....	1	1	5	7	7	11	5	....	....	6	6	3	7	6	6	6	10	14	11	1	....	....	....	155	23	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	197	T.	...	....	....	....	....	....	1	....	....	....	....	....	....	15	4	2	....	1	1	....	....	....	....	....	....	....	2	1	1	1	...	29	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	71	T.	9	8	5	3	8	1	4	14	12	15	10	6	8	8	....	....	....	1	....	2	11	1	2	4	10	8	3	3	9	3	....	168	26	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	14	T.	....	....	....	1	....	....	....	....	....	1	....	....	7	5	5	....	....	....	....	....	....	....	....	....	....	..	....	....	2	....	21	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Delaware	4	T.	....	....	1	1	....	....	....	....	....	....	....	1	4	....	1	2	....	...	1	2	....	....	....	2	3	....	....	....	....	....	. ..	18	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	2	2	A.
Dist. of Columbia	4	T.	....	....	1	1	....	....	....	....	....	..	....	...	....	....	1	....	....	....	1	1	....	..	....	1	....	....	....	....	..	....	...	6	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	38	T.	1	3	11	13	10	9	7	7	9	5	1	7	7	6	9	10	10	8	9	7	17	12	10	5	11	8	4	9	8	6	....	239	30	T.
		A.	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	50	T.	....	6	2	7	5	2	5	7	1	1	4	1	4	3	11	5	....	6	5	5	2	1	7	4	5	1	4	10	3	....	....	117	27	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	36	T.	2	...	....	....	....	1	7	3	....	....	....	....	1	2	4	2	....	....	1	....	5	1	2	2	6	4	5	5	4	1	....	58	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
Illinois	97	T.	....	13	10	1	4	4	..	....	...	10	5	5	4	20	15	20	24	28	22	8	4	14	41	19	8	3	2	16	8	21	....	329	26	T.
		A.	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	1	1	....	1	....	....	6	6	A.
Indiana	49	T.	....	....	9	....	....	4	....	....	1	....	8	7	5	....	6	13	7	11	8	....	....	....	8	3	....	....	....	....	....	4	....	94	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Indian Territory	7	T.	1	....	1	....	...	....	....	....	....	....	....	...	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Iowa	101	T.	3	7	....	....	13	....	....	1	5	18	3	1	1	7	17	4	3	28	19	2	7	17	33	8	3	11	....	14	7	10	...	142	25	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	A.
Kansas	73	T.	8	10	2	7	6	3	11	4	15	8	4	1	3	7	2	....	4	5	11	10	11	11	4	11	9	8	8	4	6	9	....	202	29	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kentucky	47	T.	....	3	5	2	....	....	2	1	....	....	1	5	2	8	3	5	13	13	13	15	...	6	15	14	8	....	1	....	1	3	....	129	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Louisiana	51	T.	3	2	5	4	1	4	10	4	1	5	1	3	4	7	16	7	5	2	3	....	....	4	2	2	7	9	14	5	2	....	....	132	27	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	13	T.	....	...	1	2	....	....	....	....	....	....	1	....	..	....	3	1	1	4	....	....	....	1	....	4	3	....	....	3	....	....	....	24	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maryland	31	T.	....	....	12	12	....	1	...	....	....	...	1	5	11	1	12	12	1	1	11	4	....	....	....	7	8	....	....	....	....	1	....	100	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Massachusetts	27	T.	....	....	2	7	1	..	....	....	6	2	....	2	15	3	7	....	....	....	....	....	....	....	....	....	....	3	....	....	....	8	...	56	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Michigan	96	T.	....	....	2	....	1	13	1	....	1	6	4	3	10	3	13	20	3	2	16	1	....	6	8	....	....	....	....	8	15	5	....	141	21	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	1	A.
Minnesota	69	T.	6	3	....	....	4	....	....	....	3	14	....	1	....	10	20	17	10	15	10	....	5	17	2	....	....	2	10	19	8	2	....	178	20	T.
		A.	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	1	....	..	....	....	....	....	....	....	....	....	1	....	....	....	....	4	4	A.
Mississippi	45	T.	1	1	7	2	1	2	6	1	....	....	....	2	2	6	9	4	1	...	2	3	2	3	....	4	2	7	5	2	2	4	....	81	25	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Missouri	96	T.	8	21	11	5	2	7	....	3	21	15	9	11	13	27	16	1	2	19	30	19	27	26	17	46	38	39	26	21	21	26	....	527	29	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	1	....	....	1	....	....	....	....	...	....	....	....	....	....	1	....	....	3	3	A.
Montana	40	T.	3	1	1	3	1	2	3	3	2	....	....	....	2	9	5	4	1	1	1	1	5	6	2	....	1	2	4	4	2	....	....	69	25	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	....	....	....	....	3	3	A.
Nebraska	112	T.	12	4	4	2	2	4	1	4	8	3	5	....	4	10	7	....	13	6	12	4	7	6	10	16	3	14	2	12	7	13	....	195	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	2	2	A.
Nevada	39	T.	....	....	....	....	....	....	3	1	5	1	....	..	1	1	1	1	....	1	....	....	....	....	1	2	3	2	1	3	1	....	....	28	16	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	23	T.	....	....	5	7	....	....	....	....	3	....	1	4	7	3	4	1	....	....	....	1	....	....	....	4	....	....	....	2	1	....	....	43	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	6	3	A.
New Jersey	54	T.	6	2	12	25	..	2	....	1	....	....	....	1	1	....	11	....	1	1	2	22	....	....	....	4	18	....	....	....	1	1	...	111	17	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	2	2	A.
New Mexico	42	T.	....	....	....	....	....	....	....	....	....	....	2	1	1	....	....	....	....	....	....	....	1	....	1	....	1	2	2	....	....	2	....	....	13	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	93	T.	....	....	19	5	1	1	1	....	....	....	....	....	13	6	7	....	1	....	3	6	....	....	1	20	....	....	....	....	....	8	....	92	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	1	....	....	....	....	3	3	A.
North Carolina	60	T.	....	4	7	17	10	1	13	8	2	3	..	15	4	4	10	7	20	17	13	11	....	1	3	22	13	8	13	5	5	8	....	244	27	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	39	T.	....	1	....	....	....	....	....	3	8	3	....	....	....	6	6	9	1	2	....	....	3	4	....	....	....	4	7	4	....	13	....	74	14	T.
		A.	....	....	....	1	....	1	....	1	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	5	5	A.
Ohio	140	T.	....	1	29	....	....	5	8	....	....	29	11	36	1	9	38	11	18	37	15	....	2	3	6	2	....	1	3	35	16	....	316	22	T.
		A.	....	....	....	....	....	....	....	1	1	....	1	....	1	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	6	6	A.
Oklahoma	20	T.	2	....	1	....	1	3	1	2	....	....	1	....	4	2	3	....	2	1	....	....	....	....	....	....	....	....	1	....	....	....	....	24	13	T.
		A.	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	3	A.
Oregon	60	T.	...	....	....	....	....	....	2	....	....	....	....	....	....	1	....	1	....	....	....	3	8	1	1	6	12	2	1	1	1	2	....	42	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	93	T.	4	....	22	16	2	....	3	1	....	....	4	8	11	1	19	3	....	....	18	5	....	....	1	18	23	....	....	..	2	2	....	164	19	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Rhode Island	6	T.	....	....	...	....	....	...	....	....	....	....	....	1	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	5	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Carolina	42	T.	1	7	12	12	6	1	12	10	1	4	3	9	6	5	12	6	4	10	11	11	2	....	4	12	13	3	10	16	3	2	....	208	29	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	46	T.	5	2	1	2	2	2	1	2	2	....	....	....	....	7	7	3	2	5	1	....	5	5	9	5	4	....	5	7	4	....	....	87	23	T.
		A.	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
Tennessee	49	T.	....	9	12	8	....	....	9	3	....	....	4	5	5	9	15	7	2	9	16	11	....	10	15	10	9	2	4	7	....	1	....	182	23	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Texas	91	T.	9	....	16	3	....	8	....	....	....	....	6	5	3	2	1	....	1	...	....	....	....	....	....	....	1	....	....	....	....	....	....	55	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	32	T.	2	....	....	....	....	....	1	4	5	1	3	2	....	....	....	....	....	....	....	1	....	....	....	....	1	2	3	....	....	....	....	25	11	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	13	T.	....	....	7	4	1	....	....	....	....	....	....	1	6	2	4	....	....	....	1	....	....	....	....	3	...	....	....	....	....	....	....	29	9	T.
		A.	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	A.
Virginia	37	T.	..	....	10	12	....	....	....	1	....	....	....	6	11	....	1	9	4	3	10	7	....	....	....	3	1	3	....	....	....	....	....	81	14	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	51	T.	....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	1	....	....	3	2	7	1	....	6	9	9	3	1	1	...	....	46	13	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
West Virginia	37	T.	....	....	4	2	....	....	2	1	....	....	....	6	9	1	....	6	3	2	8	5	....	....	....	2	2	....	....	1	2	3	....	59	17	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wisconsin	58	T.	1	9	...	2	12	2	....	1	2	16	2	3	2	....	23	29	17	8	18	....	4	25	22	....	....	. .	3	14	13	....	....	228	22	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Wyoming	14	T.	1	3	3	2	....	2	1	2	1	1	....	....	....	3	....	1	....	....	1	....	1	1	2	1	....	2	1	3	....	1	....	33	20	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Sums	2,647	T.	100	133	268	195	95	90	118	95	116	138	116	152	242	231	334	258	170	236	325	190	131	190	136	283	252	174	155	212	186	188	...	5,509	....	T.
		A.	0	2	8	1	0	2	1	2	1	0	1	2	3	2	1	7	3	0	4	1	1	2	1	2	0	4	7	1	1	1	....	56	....	A.

TABLE X.—*Hourly sunshine as deduced from sunshine recorders, June, 1897.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Hours of sunshine.			
		A. M.								P. M.								Total.			
		5	6	7	8	9	10	11	Noon*	1	2	3	4	5	6	7	8	Actual.	Possible.	Percent of possible.	Personal estimate.
																		Hours.	*Hours.*		
Albany, N. Y	T.	37	37	49	55	70	80	90	88	85	84	76	76	68	57	47	47	305.1	459.9	66	45
Atlanta, Ga	T.	63	63	62	60	64	65	74	74	68	61	47	40	37	37	37	36	242.2	431.5	56	53
Atlantic City, N. J	P.	53	53	51	58	60	64	61	59	62	66	61	60	57	48	40	34	251.2	445.9	56	46
Baltimore, Md	T.	17	19	23	39	58	69	78	73	70	66	66	57	46	27	23	22	219.0	445.9	49	45
Binghamton, N. Y	T.	30	30	44	57	67	72	77	80	77	69	65	59	52	45	36	37	261.3	456.2	57	49
Bismarck, N. Dak	P.	44	43	50	55	64	70	71	72	70	72	71	64	59	62	56	54	290.7	475.6	61	49
Boston, Mass	T.	40	42	47	54	54	65	70	68	72	65	69	59	52	53	43	35	257.5	456.2	56	43
Buffalo, N. Y	T.	44	47	56	61	60	75	79	88	84	85	84	80	65	51	37	30	300.7	459.9	65	44
Charleston, S. C	T.	38	37	39	66	86	91	94	92	89	84	80	70	60	39	23	21	288.9	428.7	67	50
Chattanooga, Tenn	T.	38	37	41	57	78	76	69	66	72	63	69	67	68	63	52	53	269.4	434.3	62	56
Cheyenne, Wyo	P.	54	58	72	74	73	72	69	61	57	53	53	57	52	48	33	32	263.3	451.9	58	51
Chicago, Ill	T.	26	23	38	51	58	64	71	73	79	75	67	63	50	26	18	24	236.1	456.2	52	47
Cincinnati, Ohio	T.	47	48	57	67	80	81	86	86	92	96	94	91	84	80	65	59	345.8	445.9	78	58
Cleveland, Ohio	T.	10	10	12	29	53	64	71	78	87	83	82	79	62	36	21	21	235.4	456.2	52	43
Columbus, Ohio	T.	37	39	55	70	83	83	91	95	92	92	85	82	75	65	59	59	333.4	449.0	74	50
Denver, Colo	P.	66	63	79	87	93	85	83	82	79	76	65	60	52	45	42	50	314.6	449.0	70	44
Des Moines, Iowa	T.	40	45	48	57	56	64	66	60	54	55	58	62	59	59	59	50	256.7	456.2	56	50
Detroit, Mich	T.	44	43	56	73	75	79	84	88	92	89	82	76	72	53	38	36	314.3	456.2	69	58
Dodge City, Kans	P.	54	59	63	68	76	87	86	80	83	86	83	87	78	73	41	31	323.2	443.1	73	61
Dubuque, Iowa	T.	37	37	42	42	50	63	73	72	77	71	64	61	55	46	44	43	253.7	456.2	56	55
Eastport, Me	P.	30	32	41	48	52	54	56	59	58	56	52	49	47	48	34	24	218.1	466.7	47	32
Erie, Pa	T.	27	28	35	40	51	58	61	69	65	69	72	74	62	48	34	34	240.7	456.2	53	48
Eureka, Cal	P.	7	20	25	34	45	47	52	56	61	62	64	66	62	59	49	24	214.8	451.9	48	45
Fresno, Cal	T.	60	60	66	87	92	93	93	94	97	96	94	92	86	77	67	65	371.2	440.2	84	83
Galveston, Tex	P.	.....	53	80	95	95	98	99	98	95	97	97	97	95	93	63	80	376.3	419.0	90	79
Harrisburg, Pa	T.	40	41	50	68	74	79	83	86	83	84	76	71	69	49	50	50	302.3	449.0	67	39
Helena, Mont	P.	40	42	52	57	63	63	65	54	48	52	52	51	47	48	41	33	241.2	475.6	51	45
Idaho Falls, Idaho	T.	44	44	65	79	81	86	83	88	92	85	80	73	57	47	44	44	318.9	459.9	69	63
Indianapolis, Ind	T.	37	41	60	70	86	91	88	90	94	94	85	82	73	69	56	50	336.5	449.0	75	66
Kansas City, Mo	P.	24	24	30	39	43	47	49	48	50	62	63	66	67	46	31	26	306.0	445.9	46	37
Key West, Fla	T.	.....	42	49	64	77	79	73	79	84	75	74	68	58	54	58	.....	375.7	410.2	67	47
Little Rock, Ark	T.	57	57	64	82	89	92	97	97	97	97	94	90	85	85	81	86	372.2	434.3	86	54
Los Angeles, Cal	P.	27	27	34	43	55	68	77	86	93	99	99	99	97	98	91	90	326.6	431.5	76	61
Louisville, Ky	T.	41	47	47	48	62	81	87	90	97	90	87	82	78	61	53	51	313.9	443.1	71	46
Minneapolis, Minn	T.	28	32	36	46	50	53	64	63	67	56	55	46	36	26	20	13	202.8	466.7	43	.....
Nashville, Tenn	T.	61	56	51	67	71	73	79	80	76	77	77	76	75	72	69	54	309.5	437.2	71	65
New Orleans, La	T.	33	40	41	46	49	63	59	56	48	56	45	48	32	21	20	25	186.9	420.9	44	45
New York, N. Y	T.	20	31	51	62	73	78	77	82	83	78	79	82	76	54	28	25	287.1	451.9	64	45
Northfield, Vt	P.	34	38	48	55	55	55	58	53	54	52	49	51	49	47	40	40	227.8	463.5	49	31
Omaha, Nebr	P.	28	29	46	64	69	76	68	66	67	66	75	68	65	56	47	38	269.6	451.9	60	41
Philadelphia, Pa	T.	29	31	35	49	55	64	74	77	80	79	69	70	52	31	20	23	243.7	449.0	54	39
Phœnix, Ariz	P.	96	97	98	100	99	99	100	96	99	98	98	99	99	98	95	93	420.2	428.7	98	88
Pittsburg, Pa	T.	20	20	21	30	55	67	69	66	73	70	72	74	71	48	40	41	242.3	451.9	54	50
Portland, Me	T.	0	13	40	49	56	59	63	67	73	64	62	53	48	35	14	0	209.3	463.5	45	33
Portland, Oreg	T.	16	15	19	24	39	53	58	72	78	75	69	59	43	27	33	35	212.6	471.7	45	42
Portland, Oreg	P.	16	21	25	28	32	38	44	38	46	55	54	53	43	36	33	37	177.5	471.7	38	42
Raleigh, N. C	T.	40	40	49	61	77	84	86	91	95	90	85	85	82	65	50	51	319.9	437.2	73	46
Rochester, N. Y	T.	44	48	50	49	56	64	68	66	70	67	61	60	48	40	34	27	248.3	459.9	54	49
St. Louis, Mo	T.	44	43	52	64	70	78	77	87	87	90	92	86	78	58	31	18	306.1	445.9	69	42
St. Paul, Minn	P.	40	40	43	49	44	46	55	48	49	49	52	42	42	36	36	32	306.9	466.7	44	33
Salt Lake City, Utah	P.	60	63	74	73	74	76	79	74	69	82	79	71	68	63	57	57	319.4	451.9	71	40
San Diego, Cal	P.	13	13	15	22	42	67	87	87	73	72	75	75	74	65	54	53	249.6	428.7	58	61
San Francisco, Cal	T.	57	58	75	85	91	93	95	94	92	90	92	90	83	74	60	50	364.2	443.1	82	63
Santa Fe, N. Mex	P.	57	67	81	92	94	92	94	85	80	69	66	66	59	64	55	33	326.8	437.2	75	64
Savannah, Ga	P.	58	70	86	88	89	87	84	84	87	85	75	69	61	38	19	17	309.0	425.8	73	48
Seattle, Wash	T.	4	8	24	43	51	58	71	72	78	73	69	58	56	40	23	18	223.0	479.8	46	32
Spokane, Wash*	P.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	479.8	.....	36
Tampa, Fla	T.	.....	83	83	74	63	68	79	74	71	71	78	69	59	63	63	.....	296.7	416.2	71	64
Vicksburg, Miss	T.	64	64	78	90	93	97	98	96	94	93	95	94	87	84	63	62	371.4	425.8	87	65
Washington, D. C	P.	47	48	53	57	58	58	61	71	65	73	69	55	54	55	47	46	258.8	445.9	58	46
Wilmington, N. C	T.	38	37	55	78	89	94	96	90	95	94	90	77	63	53	39	38	319.3	431.5	74	62

*Instrument out of order.

TABLE XI.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during June, 1897, at all stations furnished with self-registering gauges.*

Station.	Date.	Total duration.		Total am't of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time as indicated.												
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	29-30			1.22														0.28			
Atlanta, Ga.	8	2.10 a. m.	4.30 a. m.	0.73	2.49 a. m	3.24 a. m.	0.05	0.19	0.35	0.39	0.44	0.48	0.55	0.60							
Atlantic City, N. J.	15	6.19 p. m.	7.35 p. m.	0.90	6.41 p. m.	7.13 p. m.	0.05	0.10	0.28	0.50	0.60	0.65	0.82	0.85							
Baltimore, Md.	4-5	4.33 p. m.	8.18 a. m.	0.82	4.48 p. m.	5.05 p. m.	0.05	0.16	0.40	0.49	0.50										
Binghamton, N. Y.	29-30			0.86							0.28										
Bismarck, N. Dak.	16	7.58 p. m.	9.15 p. m.	1.17	8.15 p. m.	8.42 p. m.	0.15	0.05	0.14	0.49	0.64	0.89	0.99	1.09	1.14						
Boston, Mass.	9-10			1.94														0.69			
Buffalo, N. Y.	29			0.75														0.42			
Cairo, Ill	22	3.45 a. m.	11.45 a. m.	3.28	3.56 a. m.	6.00 a. m.	T.	\0.03	0.10	0.30	0.52	0.65	0.90	1.08	1.30	1.46	1.56				
								/1.61	1.69	1.70	1.73	1.85	1.94	1.96	1.98	2.12	2.26	2.52	2.78		
Charleston, S. C.	5	8.55 a. m.	10.30 a. m.	1.33	9.02 a. m.	9.50 a. m.	0.02	0.08	0.31	0.51	0.57	0.59	0.71	0.91	0.94	0.98	1.10	1.16			
Do	22	9.10 a. m.	4.15 p. m.	1.47	9.11 a. m.	9.42 a. m.	0.01	0.22	0.42	0.52	0.77	0.83	0.90	0.91	0.92						
Chicago, Ill.*	16-17			1.86														0.83			
Cincinnati, Ohio	17			0.53														0.25			
Cleveland, Ohio	11			0.52														0.36			
Denver, Colo.	10-11			0.99														0.50			
Des Moines, Iowa	23	12.50 p. m.	2.00 p. m.	0.60	12.56 p. m.	1.20 p. m.	T.	0.26	0.38	0.48	0.55	0.59									
Detroit, Mich	16	4.25 a. m.	5.40 a. m.	0.96	4.33 a. m.	5.15 a. m.	0.05	0.05	0.25	0.38	0.45	0.53	0.63	0.71	0.80						
Dodge City, Kans.	14			0.55													0.55				
Duluth, Minn.	28			0.80														0.52			
Eastport, Me.	20			0.86														0.27			
Erie, Pa	7			1.49														0.28			
Galveston, Tex.	3			0.28														0.27			
Harrisburg, Pa.	8-9			0.81														0.12			
Hatteras, N. C.	5-6	12.08 p. m.	2.30 a. m.	2.06	6.17 p. m.	6.47 p. m.	0.35	0.08	0.18	0.48	0.63	0.70	0.75								
Do	29	4.00 a. m.	5.17 a. m.	0.80	4.07 a. m.	4.31 a. m.	0.05	0.10	0.25	0.53	0.65	0.70									
Indianapolis, Ind.	16-17			1.15														0.54			
Jacksonville, Fla.	6	3.40 p. m.	5.10 p. m.	1.68	3.40 p. m.	4.50 p. m.	0.00	0.30	0.43	0.53	0.61	0.85	0.92	0.97	0.98	1.00	1.03	1.34	1.66		
Do	20	8.40 p. m.	10.25 p. m.	0.74	8.40 p. m.	9.00 p. m.	0.00	0.15	0.45	0.60	0.72										
Jupiter, Fla	8	1.00 p. m.	4.00 p. m.	1.59	\1.15 p. m.	1.38 p. m.	0.10	0.03	0.06	0.10	0.35	0.55	0.69	0.90	0.95						
					/2.28 p. m.	2.48 p. m.	1.04	0.15	0.30	0.41	0.45	0.48									
Kansas City, Mo	13	6.45 p. m.	7.20 p. m.	0.52	7.00 p. m.	7.15 p. m.	T.	0.22	0.44	0.50											
Do	26	1.40 a. m.	4.20 a. m.	2.40	1.49 a. m.	2.30 a. m.	T.	0.35	0.65	1.00	1.25	1.58	1.75	1.87	1.95	1.97	1.98	2.00	2.15	2.30	
Key West, Fla.	11	10.45 a. m.	2.15 p. m.	0.74	11.01 a. m.	11.21 a. m.	0.10	0.22	0.38	0.47	0.52	0.56									
Lincoln, Nebr.	20			0.50													0.48				
Little Rock, Ark.	27	4.54 p. m.	5.45 p. m.	1.02	5.02 p. m.	‡	0.01	‡	‡	‡	‡	‡	‡	‡	‡	‡	1.02				
Louisville, Ky.	20	3.25 p. m.	3.50 p. m.	0.51	3.28 p. m.	3.42 p. m.	0.01	0.26	0.41	0.48											
Memphis, Tenn.	27	8.25 p. m.	9.45 p. m.	0.95	8.27 p. m.	9.02 p. m.	0.01	0.07	0.20	0.44	0.61	0.79	0.88	0.91							
Milwaukee, Wis.	23			0.42														0.42			
Montgomery, Ala.	16	3.35 p. m.	4.40 p. m.	1.04	3.58 p. m.	4.22 p. m.	0.03	0.22	0.50	0.67	0.77	0.88									
Do	19	4.40 p. m.	5.20 p. m.	0.80	4.52 p. m.	5.17 p. m.	0.01	0.22	0.44	0.65	0.72	0.76									
Do	25	5.30 p. m.	6.25 p. m.	0.83	5.32 p. m.	5.52 p. m.	0.01	0.21	0.49	0.73	0.80										
Nantucket, Mass.	30			0.79														0.28			
Nashville, Tenn.	19			0.81														0.44			
New Orleans, La.	16	2.03 p. m.	6.05 p. m.	1.75	2.52 p. m.	3.12 p. m.	0.04	0.30	0.40	0.58	0.75	0.76	0.76	0.76	0.76	0.76	0.78	0.90	0.95	0.96	
Do	26	6.28 p. m.	7.10 p. m.	0.80	6.30 p. m.	7.00 p. m.	0.01	0.20	0.30	0.40	0.52	0.62	0.75	0.80							
New York, N. Y.	4	6.16 p. m.	8.38 p. m.	0.60	6.29 p. m.	6.39 p. m.	T.	0.42	0.57												
Do	8-9	9.31 a. m.	4.15 p. m.	1.79	11.35 p. m.	12.05 a. m.	0.97	0.05	0.13	0.23	0.38	0.53	0.60								
Norfolk, Va.	13			0.65														0.42			
Omaha, Nebr.	30	3.50 a. m.	6.20 a. m.	0.52	4.17 a. m.	4.37 a. m.	0.04	0.15	0.26	0.36	0.41										
Philadelphia, Pa.	25	5.39 p. m.	6.15 p. m.	0.34	5.47 p. m.	5.57 p. m.	0.01	0.17	0.33												
Pittsburg, Pa	19			0.41									0.40								
Portland, Me.	20			0.92														0.39			
Portland, Oreg.	25			0.38											0.31						
Raleigh, N. C.	24	1.00 a. m.	2.00 a. m.	1.54	1.17 a. m.	1.57 a. m.	0.04	0.08	0.35	0.53	0.69	0.83	0.98	1.15	1.41	1.49					
Rochester, N. Y.	29			0.60														0.25			
St Louis, Mo.	22	1.30 a. m.	9.30 a. m.	1.49	1.40 a. m.	3.00 a. m.	T.	0.18	0.39	0.54	0.56	0.57	0.58	0.59	0.60	0.60	0.61	0.77	0.89		
St. Paul, Minn																					
Salt Lake City, Utah	15-16			0.37														0.10			
San Diego, Cal.	14			T.																	
San Francisco, Cal.	19-20			0.17														0.03			
Savannah, Ga	15	4.40 p. m.	6.15 p. m.	1.60	4.40 p. m.	5.35 p. m.	T.	0.15	0.39	0.71	0.95	1.11	1.21	1.34	1.42	1.49	1.55	1.60			
Seattle, Wash.	21-22			0.92														0.19			
Tampa, Fla.	7	2.05 p. m.	5.15 p. m.	3.52	2.30 p. m.	†	0.20	0.05	0.10	0.15	0.38	0.70	1.15	1.55	1.95	†					
Do	21-22	D. N.	D. N.	0.90	11.57 p. m.	12.27 a. m.	0.05	0.11	0.25	0.49	0.65	0.72	0.77								
Do	28	6.25 p. m.	6.55 p. m.	0.90	6.32 p. m.	6.53 p. m.	0.05	0.28	0.62	0.68	0.78	0.85									
Vicksburg, Miss.	3-4	6.52 p. m.	2.40 a. m.	1.24	7.44 p. m.	8.05 p. m.	0.06	0.10	0.32	0.55	0.64										
Do	15	12.58 p. m.	3.10 p. m.	0.90	1.01 p. m.	1.48 p. m.	0.01	0.08	0.26	0.45	0.45	0.45	0.45	0.45	0.51	0.74	0.84				
Washington, D. C.	17	2.30 p. m.	4.55 p. m.	1.09	3.30 p. m.	4.40 p. m.	0.01	0.16	0.26	0.34	0.41	0.51	0.58	0.64	0.70	0.72	0.77	0.90	1.06		
Wilmington, N. C.	5	10.13 a. m.	11.40 a. m.	1.55	10.17 a. m.	10.37 a. m.	0.01	0.17	0.58	0.90	1.23	1.30	1.32	1.36	1.43	1.47					
Yankton, N. Dak.	28-29			0.74														0.24			

*Self register out of order. †Gauge overflowed at 2.53 p. m., after which 1.57 inches fell, making a total fall of 3.52 inches in 3 hours and 10 minutes. ‡Instrument broken by storm soon after heavy rain began, 1.02 inches fell in 51 minutes.

TABLE XII.—*Excessive precipitation, by stations, for June, 1897.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Birmingham		2.75	16			
Citronelle				1.28	1 00	8
Gadsden				1.35	1 00	23
Hamilton				2.13	2 00	28
Montgomery				1.05	0 55	16
Newburg				2.03	2 00	28
Arkansas.						
Dallas		3.52	2-3	2.10	1 15	14
Little Rock				1.02	0 51	27
Warren				1.13	1 00	4
Colorado.						
Fort Morgan				1.45	0 20	14
Gold Hill		4.35	10			
Wray		2.57	8-9			
Yuma				1.00	0 30	28
Connecticut.						
Canton		3.14	9			
Southington		2.75	8-9			
West Cornwall		2.65	8-9			
Windsor		2.55	9			
Florida.						
Brooksville		2.53	29	2.53	1 15	29
Earnestville				1.10	1 00	21
Eustis				2.32	0 45	22
Federal Point		2.51	18-19			
Gainesville				2.17	1 00	30
Huntington		2.90	4			
Jacksonville				1.32	1 00	6
Kissimmee		2.80	6			
Lake City		2.51	18			
Merritts Island				1.44	0 30	17
Myers				1.01	1 00	4
Orange City				1.10	1 00	14
Sebastian		3.22	6			
Tampa		4.10	7	1.00	0 48	7
Do				1.00	0 30	28
Georgia.						
Alapaha				1.17	0 55	18
Belleville		2.50	6			
Blakely		3.28	20			
Brag				1.47	0 20	13
Cedartown				1.31	1 15	15
Covington				1.25	0 30	27
Elberton				1.50	1 00	16
Jesup				1.51	0 40	11
Macon				1.18	1 05	6
Do				1.57	1 15	20
Marshallville				1.50	1 00	15
Millen				1.03	0 57	21
Quitman		3.87	6			
Rome				1.53	1 00	15
Savannah				1.50	1 00	15
Illinois.						
Alexander		2.95	24			
Beardstown		2.52	23-24			
Cairo		4.59	22-23	2.92	2 15	22
Chester		2.95	19	2.95	1 05	19
Dixon		2.80	23			
Dwight				1.40	0 40	17
Effingham		2.50	23			
Fort Sheridan		3.00	16-17			
Iron		3.25	22			
Joliet		3.36	16-17			
Kishwaukee		2.51	23			
Knoxville				1.00	1 00	30
Laharpe				2.25	1 30	30
Mount Pulaski				1.75	1 35	30
Mount Vernon		4.10	22	3.25	3 00	22
Oswego				1.50	1 30	18
Ottawa		3.57	22-23			
Philo				1.80	0 50	23
Roundgrove		2.70	17			
Sycamore		2.83	23			
Indiana.						
Bluffton		3.17	16			
Fort Wayne		2.88	16	2.00	1 30	16
Knightstown				1.13	1 00	16
Knox				2.00	2 00	16
Kokomo		3.16	18			
Vevay		2.60	17-18			
Winamac		4.30	16			
Indian Territory.						
Lehigh		3.42	13-14			
Purcell		5.65	13-14			
South McAlester		3.15	13-14			
Iowa.						
Bonaparte				1.02	1 00	30
Cresco				1.25	1 00	19
Estherville		2.85	16			
Fayette		2.59	28	1.34	1 00	28
Fort Madison				1.26	1 15	30
Keosauqua		3.30	23-24			
Mooar		3.05	24			
Mountayr				1.80	1 00	30
Mount Pleasant		3.10	23			
Osage				1.32	0 35	29
Osceola				1.80	1 00	22
Oskaloosa		2.87	19			
Red Oak		2.50	26			
St. Charles				1.00	0 45	11

TABLE XII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Iowa—Continued.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
St. Charles				1.42	0 55	23
Sigourney				1.00	0 30	15
Kansas.						
Atchison		3.38	26			
Beloit		3.06	13			
Blaine		4.27	26			
Colby				1.70	0 35	7
Do				1.90	1 10	29
Fort Scott	10.52	6.34	25	6.34	6 00	25
Gove		3.15	10-11			
Horton		3.08	26			
Independence				1.34	0 50	2
Mounthope				1.77	0 30	7
Osborne		2.50	14			
Ottawa	11.01	3.48	24-25	2.20	2 00	7
Sharon Springs				1.00	0 30	29
Topeka		2.62	24-25			
Kentucky.						
Bardstown				2.33	1 00	20
Blandville		2.51	22-23			
Loretto				1.82	1 30	19
Pleasure Ridge Park				1.50	0 35	18
Louisiana.						
Bastrop		2.53	3			
Grand Coteau				1.30	1 00	26
Houma		3.20	29	3.20	1 10	29
Lake Charles		2.90	8			
Melville		2.50	16	2.50	2 00	16
Montgomery				1.70	1 00	25
Oberlin		2.50	13	2.50	1 00	13
Do				2.00	2 00	21
Oxford				1.31	0 10	11
Sugar Experiment Station				1.56	1 30	1
Do				1.15	0 20	10
Do				1.20	0 30	12
White Sulphur Springs		3.33	3			
Maryland.						
Solomons		2.92	24	2.92	2 30	24
Massachusetts.						
Amherst		3.95	9			
Groton		2.50	9			
Lawrence		2.56	9-10			
Leeds		2.69	9			
Springfield Armory		3.13	8-9			
Wakefield		2.88	9-10	1.15	0 40	4
Michigan.						
Alma				2.40	2 00	15
Ewen				1.00	1 00	21
Kalamazoo		2.89	16			
Olivet		4.24	16-17			
Minnesota.						
Ada		2.60	28			
Beardsley		3.10	27			
Bermidji		2.50	15			
Blooming Prairie				1.50	0 20	10
Lakeside		2.60	1			
Do		2.60	15			
Long Prairie		2.74	27-28			
Minneapolis		2.55	1-2			
Moorhead		4.36	27-28	2.10	1 35	27
St. Paul		2.51	1-2			
Mississippi.						
Hazlehurst				1.40	0 15	16
Magnolia				1.40	1 00	3
Thornton				2.00	2 00	4
Windham				1.24	1 00	3
Missouri.						
Akron		3.52	30			
Arthur	10.76	5.65	24-25			
Avalon		2.50	26			
Columbia				1.15	0 28	24
Conception	11.67	4.12	26			
Elmira	11.47	6.40	30			
Emma		2.75	26			
Fairport				1.27	0 45	26
Farmersville		2.61	26-27			
Fayette		2.83	24			
Fulton				1.31	1 00	28
Gallatin		3.10	26-27			
Gordonville		2.60	21			
Hannibal		2.84	21-22			
Houstonia		4.43	26			
Humansville				1.15	0 35	26
Ironton	10.69	2.77	22			
Jefferson City		2.70	26-27			
Kansas City		4.37	26-27	2.00	1 00	26
Kidder				1.02	0 28	24-25
Lamar		2.70	25			
Lamonte				2.14	1 30	18
Liberty		4.95	27			
Mexico		2.82	22-23			
Nevada		4.09	24-25			
New Palestine				1.00	0 45	30
Oakfield		3.19	21-22			
Palmyra		3.21	22			
Platte River				1.42	1 00	26
Poplar Bluff		2.51	27-28			
Princeton		2.60	30			
Stellada		2.51	26-27			
Virgil City		3.99	24-25			

TABLE XII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Missouri—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Warrenton		2.97	21-22			
Montana.						
Havre		2.65	15-16			
Nebraska.						
Arapaho				1.10	1 00	9
Do				1.10	0 30	26
Calloway				1.20	1 00	29
Chester		4.29	26			
Greeley Center		5.05	30			
Hastings				1.25	1 15	25
Holdrege				1.00	1 00	26
Indianola (near)		2.90	26	2.90	2 15	26
Kirkwood				1.29	1 00	23
Loup		2.90	30	2.90	2 00	30
Nesbit				1.25	0 40	21
North Loup		3.52	29			
Redcloud	10.93	5.71	26-27			
Superior		3.01	26-27			
New Hampshire.						
Concord		4.42	9-10			
Durham		6.79	9-10			
Newton		4.35	9-10			
North Conway		2.57	9-10			
Sanbornton		3.71	9-10			
New Jersey.						
Newark		2.55	8-9			
Sergeantsville		2.75	8-9			
New Mexico.						
Ocate		3.04	26			
Raton				2.05	0 30	27
Roswell				1.05	1 00	19
New York.						
Cooperstown		2.50	9			
Gloversville		2.59	9			
North Carolina.						
Flatrock		3.61	3			
Highlands		2.72	2			
Lynn		3.43	7			
Mana				1.45	1 00	4
Mount Pleasant		2.72	7			
Raleigh				1.56	1 00	24
Sloat				2.02	1 00	24
Springhope		3.50	15	3.50	2 00	15
Wilmington				1.54	1 00	5
North Dakota.						
Bismarck				1.15	0 45	16
Fargo		4.18	28			
McKinney	10.40	7.70	15			
Napoleon		3.52	8-9			
Valley City		2.88	27			
Wahpeton				1.70	1 00	18
Ohio.						
Hackney		2.50	7			
Hedges		2.65	16			
Kenton				1.19	0 31	16
Pomeroy				1.68	0 40	3
Wauseon				1.03	0 35	29
Oklahoma.						
Norman		2.64	16			
Stillwater		2.58	13-14			
Pennsylvania.						
Beaver Dam		4.24	7	4.24	3 45	7
Davis Island Dam		3.12	8			
Elwood Junction		3.07	7-8			
Everett				2.00	1 00	24
Forks of Neshaminy		3.26	8-9			

TABLE XII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Pennsylvania—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Hamburg		2.61	3			
Mahoning				1.06	0 39	14
Point Pleasant		2.85	9			
Shawmont		2.90	8-9			
Smiths Corners		2.50	9			
Rhode Island.						
Kingston		2.62	9			
South Carolina.						
Batesburg				1.40	1 20	5
Blackville		3.69	8			
Camden				1.09	1 00	6
Charleston				1.00	0 25	22
Florence				2.03	1 30	15
Gillisonville				1.10	1 00	23
Little Mountain				1.27	0 30	3
Pinopolis		4.80	4-5			
Spartanburg				1.27	0 50	30
Statesburg				1.96	0 40	4
Trial				1.25	0 25	5
Do				1.24	1 00	25
South Dakota.						
Alexandria		2.53	1			
Armour		2.94	1			
Flandreau		3.02	1-2			
Parkston		4.00	1			
Tennessee.						
Greeneville				1.40	0 25	25
Hohenwald				1.38	1 15	23
Jackson				1.70	1 00	27
Rogersville				2.31	1 35	25
Texas.						
Bowie		2.90	11-12			
Brighton		2.67	4			
Coleman		3.60	11			
Dublin		3.22	11-12			
El Paso				1.20	1 00	30
Emory		3.40	3			
Fort Worth		2.50	3			
Fredericksburg				1.55	0 30	6
Golindo				2.05	1 45	12
Longview		2.50	3			
Marshall		2.50	4			
Palestine				1.64	1 05	6
Sanderson				1.10	0 45	12
San Marcos		2.55	3	2.55	1 15	3
Do				1.59	1 00	6
Temple		4.30	2			
Do		2.55	6			
Weatherford				1.97	1 50	3
Vermont.						
Strafford		2.70	9-10			
Vernon		3.50	9			
Virginia.						
Ashland		2.51	4-5			
Farmville		3.00	4			
West Virginia.						
Grafton		2.80	16-17			
Philippi		2.50	13			
Wisconsin						
Amherst		5.20	28			
Butternut		3.30	2-3			
Gratiot		4.50	16			
Greenbay		3.06	15-16			
Lincoln				1.96	0 45	13
Viroqua		3.19	28-29			
Waupaca		3.16	28-29			

Chart I. Tracks of Centers of High Areas. June, 1897.

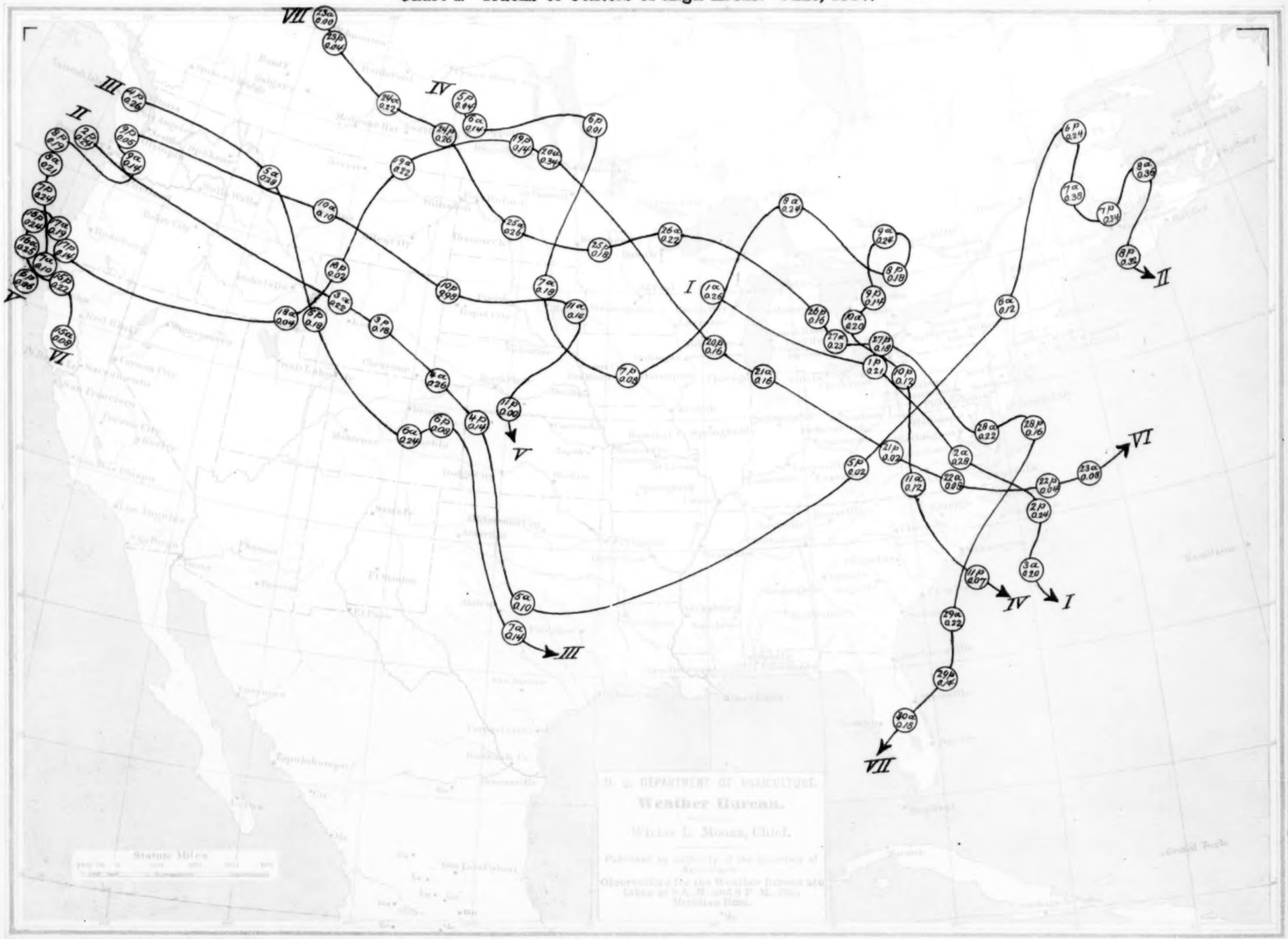

Chart II. Tracks of Centers of Low Areas. June, 1897.

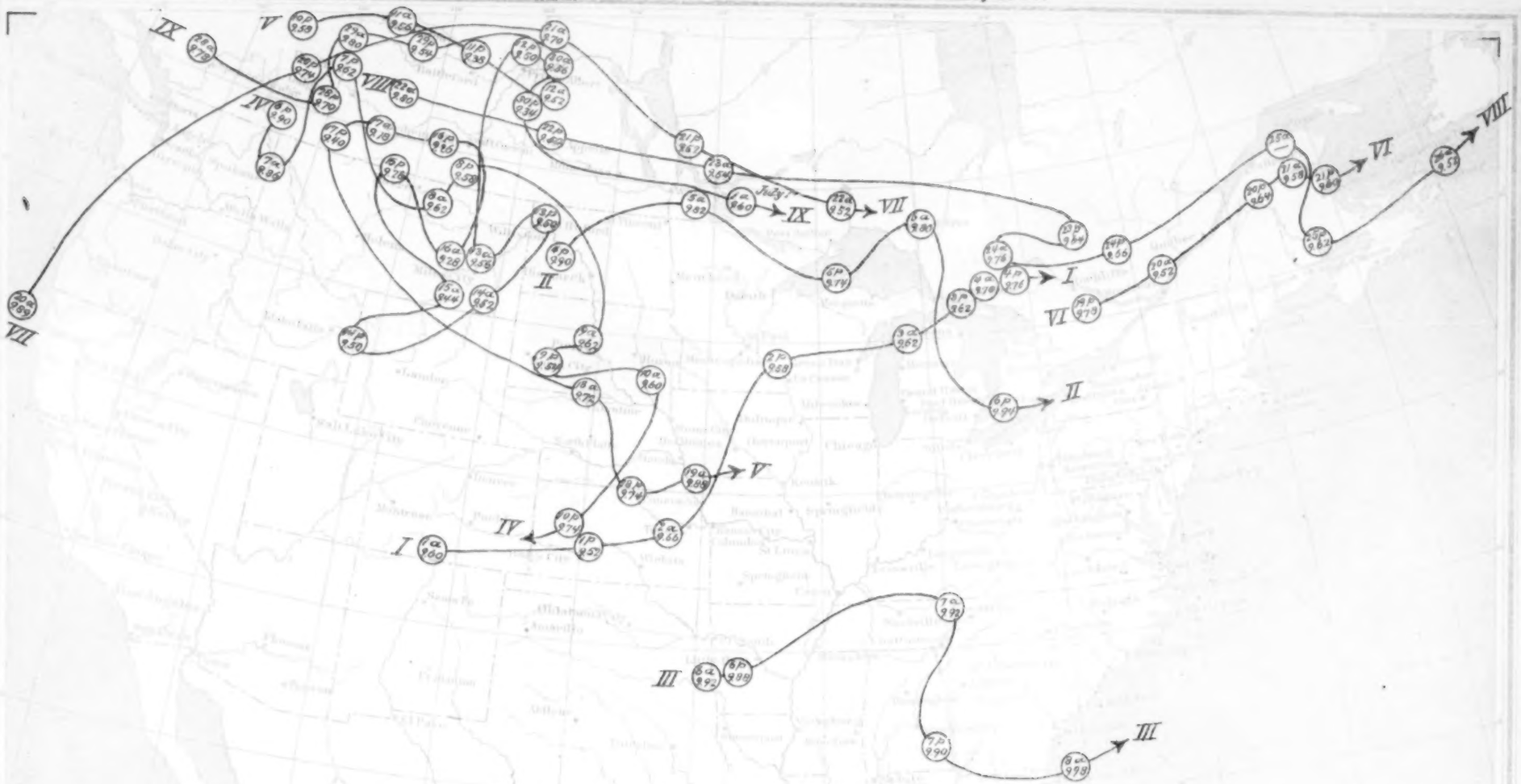

Chart III. Total Precipitation. June, 1897.

Chart III. Total Precipitation. June, 1897.

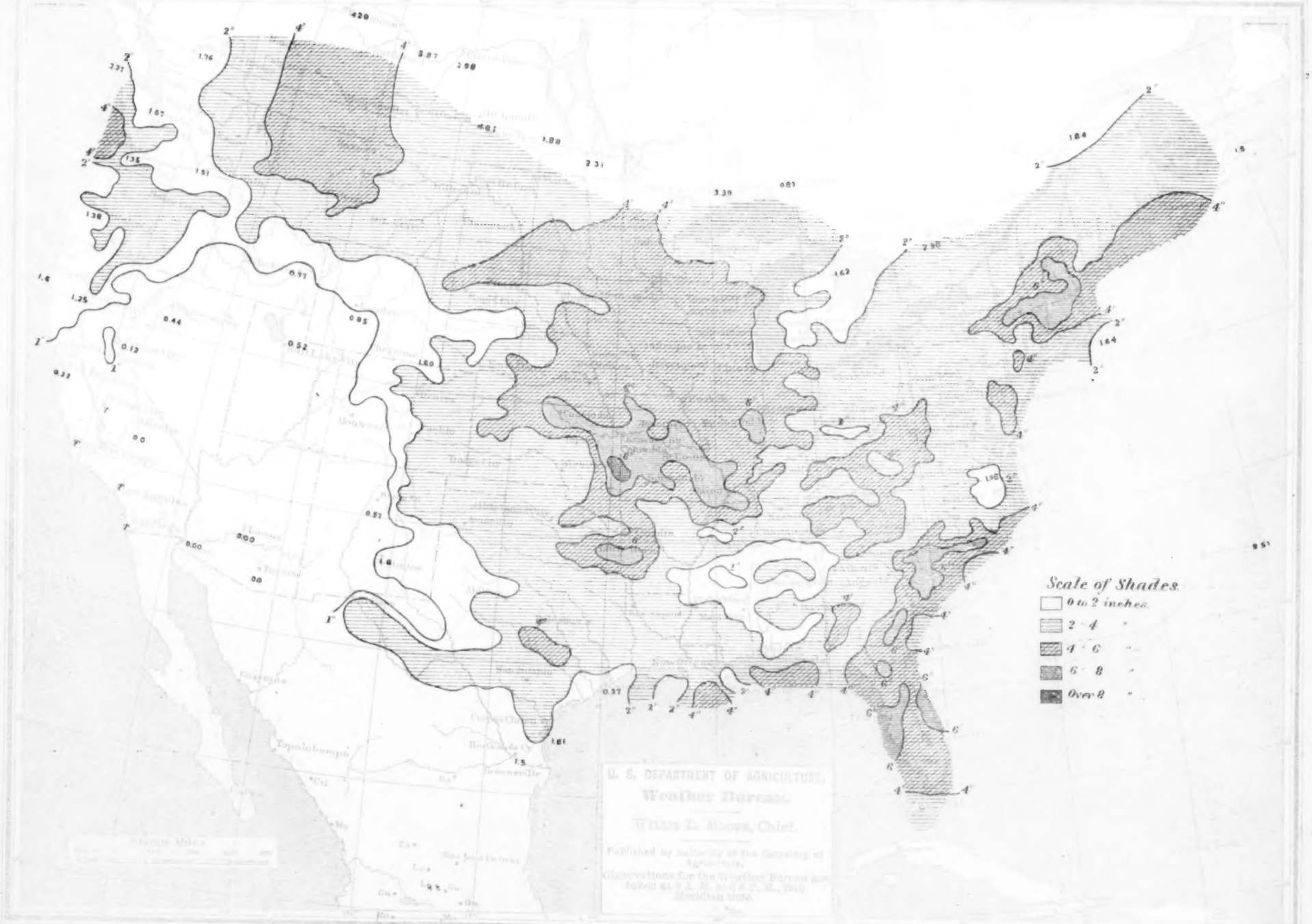

Chart IV. Isobars, Isotherms, and Resultant Winds. June, 1897.

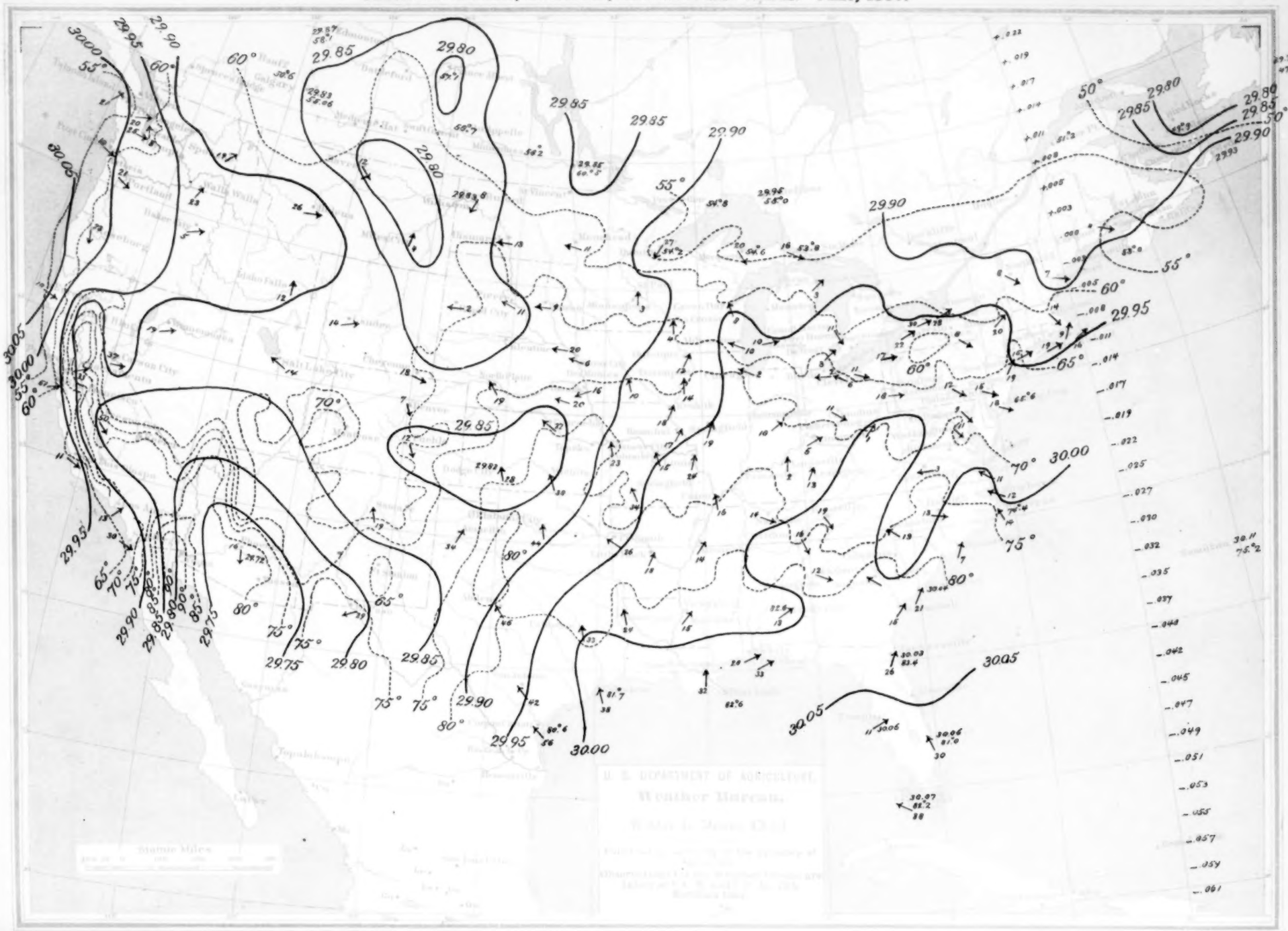

Chart V. Hydrographs for Seven Principal Rivers of the United States.